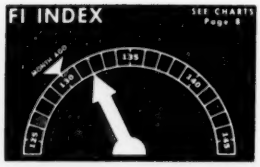
NATIONAL EDITION

Food Industries

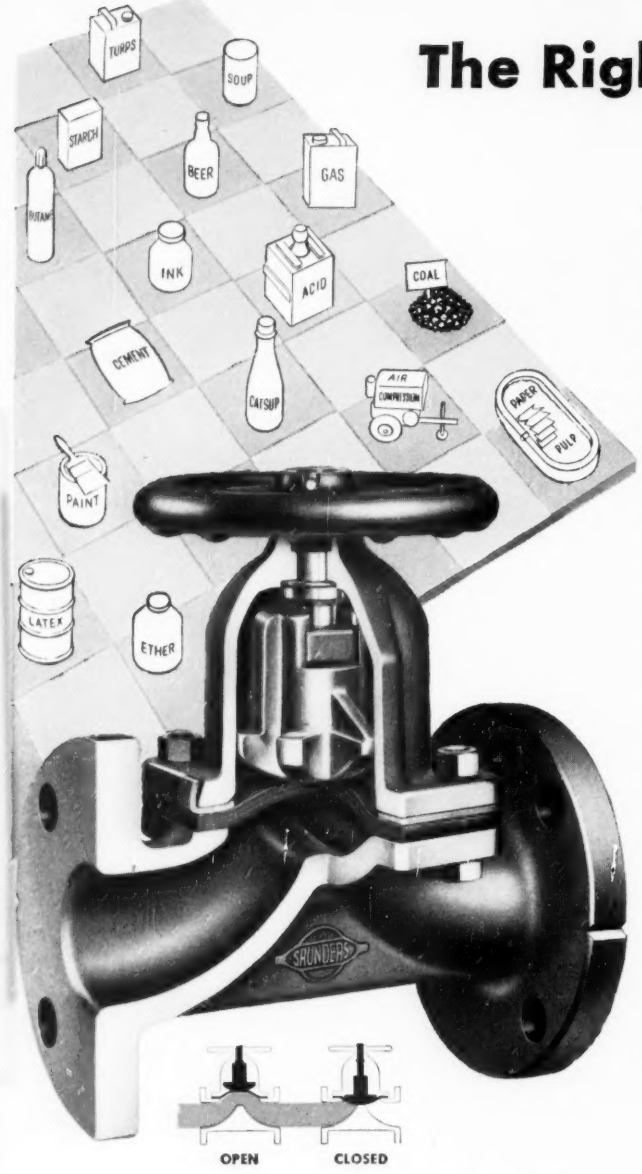
For those who control quality and costs through management and production—a McGraw-Hill publication

Bacon stays fresher longer after Armour vacuum-bags and seals it in this special machine. (See p. 38)



DECEMBER, 1950: Mechanizing zooms output, Distribution knots cut, Quats vs. flavor, Food likes and dislikes, Canning line tips, Centrifuge report

The Right Move . . .



to prevent corrosion, contamination or clogging

Whenever corrosion, abrasion, contamination, clogging, leakage and maintenance are problems . . . Grinnell-Saunders Diaphragm Valves provide trouble-free performance. Working parts are absolutely isolated from the fluid in the line, preventing corrosion or contamination. Smooth passage, without pockets, eliminates trapping of solid matter and reduces friction resistance to a minimum. The diaphragm lifts high for streamlined flow in either direction. It presses tight for positive closure against grit, scale, solid matter . . . against pressure or vacuum. No packing glands to demand attention . . . no metal-to-metal seats to become damaged or wire-drawn . . . no refacing or reseating. Various body, lining and diaphragm materials are available to meet particular service conditions.

The Grinnell-Saunders Diaphragm Valve is typical of Grinnell's complete piping service which provides the products, facilities and experience required "whenever piping is involved". Grinnell Company, Inc., Providence 1, R. I.

Grinnell-Saunders Diaphragm Valve

Available in various combinations of valve bodies and operating mechanisms. Write for catalog.

GRINNELL

pipe • valves • Grinnell-Saunders diaphragm valves • pipe and tube fittings • welding fittings • engineered pipe hangers and supports prefabricated piping • Thermolier unit heaters • plumbing and heating specialties • industrial supplies • water works supplies Grinnell automatic sprinkler fire protection systems • Amco humidification and cooling systems

FOOD INDUSTRIES, December, 1950, Vol. 22, No. 12. Published monthly by McGraw-Hill Publishing Co., Inc. Publisher, Edwin D. Fowle. Price 35¢ per copy. Publication office, 99-129 N. Broadway, Albany 1, N. Y. Subscription rates: United States and possessions, $2 for 1 yr., $3 for 2 yr., $4 for 3 yr. Canada, $4 for 1 yr., $6 for 2 yr., $8 for 3 yr. (payable in Canadian or U. S. funds). Pan American Countries, $5 for 1 yr., $8 for 2 yr., $10 for 3 yr. Entered as second class matter Aug. 26, 1948, at Albany post office under Act of Mar. 3, 1879.

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TO MAKE IT HANDY

Products and literature in this issue are listed on these pages. There are three indexes: (1) editorial items on new equipment, new supplies, new literature; (2) products advertised; (3) advertisers.

WHAT THE NUMBERS MEAN

Advertisements: There is a page number on the postcard for each advertisement. Before the number may appear, L, R, T, B (left, right, top, bottom) locating the ad on the page; small letters following (a, b, c) indicate additional products in the advertisement.

Editorial Items: There is a page number on the postcard for each item; ABC's distinguish specific items on page.

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For more data, circle item number on postcard

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Company .....

Address .....

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specialties • industrial supplies • water works supplies
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4a	25a	98b	114b	125b	139	TL158	BR170b	L188	207b
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22-23b97		113	124c	BR137c	157b	TR170	186	R206	

OTHER REQUEST, OR COMMENT.....

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Name..... Position.....

Company .....

Address .....

Card Expires March 10, 1951

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56E	59A	91B	96C	100C	167E	167L	167S	168G	170C	
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Food Industries

DECEMBER, 1950 • VOL. 22, NO. 12

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PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

HIGHLIGHTS

X-ray inspection of canned foods is being tested by the Quartermaster. Method is said to indicate condition of can's contents as well as external can defects and foreign matter inside the can. Cans need not be removed from the cases for this inspection, which can be carried out on conveyor system. Canners, however, are skeptical.

Quality and quantity of gluten in wheat can be measured by a simple sedimentation test developed by USDA. It's based on fact that gluten, in a cold water suspension, swells rapidly. (News)

A "sleeper" in new bread standards would prohibit present use of even the mono- and diglycerides of fat-forming fatty acids unless they were premixed as an ingredient of the shortening. Because of P&G's patents and its licensing arrangement with Swift & Co., provision is said to virtually limit baking industry to use of the shortenings of these companies. Petition has been filed by Independent Meat Packers Assn.

If a packaged frozen food has been permitted to thaw at any point in the distribution channel, an enclosed indicator can now warn the consumer. Device combines oxidizing enzyme and ascorbic acid. (Pg. 84)

Milk and tomato juice concentrates—both unfrozen—gained limelight during the month. The milk was sales tested in Wilmington, Del., by National Dairy. Tomato juice, along with a tomato paste concentrate, are produced in a specially designed low-temp concentrator. (News)

Ice cream sandwiches are made at rate of 125 doz. per hour by machine that takes the ice cream directly from continuous freezers. Wafers are automatically placed on the cream, then sandwich is bagged and discharged to packing table. (Pg. 56)

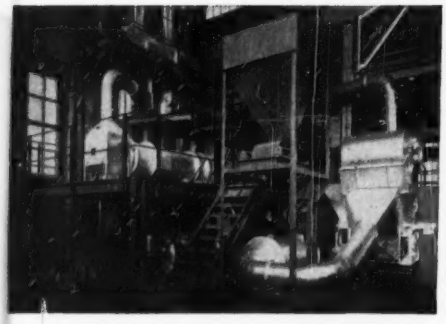
Flat-flavors in soft cheeses are caused by traces of quaternaries. As little as 2 ppm. in cheese milk prevents growth of aroma-producing organisms and results in "dead" cheese. So check thoroughness of rinsing of farm and plant equipment if you have starter trouble. (Pg. 49)

Desiccation of lima beans during processing and freezing is eliminated by substitution of fluming for other conveying methods. Use of chilled water for this purpose at the Exmore, Va., plant of John H. Dulany & Sons, Inc., also cuts refrigeration power cost by 25 percent. (Pg. 75)

Full-flavored grape juice concentrate is made in a single pass by improved evaporator developed at ERRL. When reconstituted, frozen concentrate was indistinguishable from original juice. (Pg. 60)

Soft ice cream of any desired flavor, made from bulk vanilla ice cream by a new machine, the Whirla-Whip Homogenator, rated tops in interest at the recent Dairy Industries Exposition. Operator puts individual portion of bulk ice cream in cone-shaped open-bottom cup, adds desired flavoring, then places cup on Homogenator. When lever is operated, soft ice cream is extruded from cup's bottom into dish or cone.

You Don't Guess HOW



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Now you can pre-determine the best method for achieving the drying, cooling and processing results you want. Link-Belt Research Engineers invite you to ship your material to the Link-Belt Drying Laboratory for a series of test runs. They invite you to cooperate with them in determining the proper type of equipment and procedures—*which can then be duplicated in your plant.* The Link-Belt Laboratory removes the "guess-work."

A test run can be arranged at your convenience. Simply write or phone the nearest Link-Belt Plant or Office. Send for catalogs.

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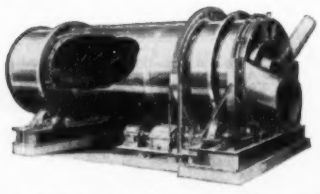
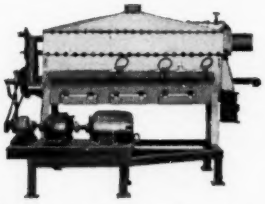




LINK-BELT COMPANY Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities. 11,821

The Talk of the Industry

Metals for Food Machines Tight

Better get your order in if you need new corrosion-resistant equipment. Stainless steel became tight after the Reds crossed the 38th parallel and precipitated scare buying. One machinery maker received more orders in six weeks than in the previous seven months.

While orders have since tapered off, the shortage of nickel and the high military demands for stainless alloys worry food machinery builders. It is perhaps significant that a large food equipment manufacturer is using plastic paint on machine bases and parts not coming in contact with the product.

To make matters worse, copper and aluminum also are tight. Fortunately, tin supplies look reasonably adequate. But the tin picture would change quickly if the Reds pushed through to Malaya.

Here's hoping food equipment builders don't have to go to the high-chrome stainless used in World War II. It doesn't stand up so well.

Anyway, you better overhaul your maintenance program and take loving care of the equipment you already have.

New High in Dollar Technology

When you combine statistical quality control and electronics you really can do tricks on the production line. Both of these sciences look forbidding, but they're no worse than the bacteriology which food men take in stride.

Skipping the technicalities, let's take a look at a very practical money-saving application in food packaging. It is the control of net weight on the production line to avoid the expensive mistake of packaging profits as overweight.

First, net weight tolerance limits are determined by statistical quality control methods. Then electronic equipment is installed on the filling line to automatically check net weight, make computations, and operate a servomechanism that adjusts the filler—when, and only when it should be adjusted—and by the correct amount.

Science is wonderful, especially when it saves dollars.

Old Frozen Food Doing Nicely

Per capita ice cream consumption has increased 47 percent since 1940—from 19 to 28 pints. Low-temperature domestic storage facilities have boosted sales, and high consumer income has helped all-around. But quality had to be there—as always in a food success story.

Progress Has Chain Reaction

It is interesting to see how progress in one branch of the industry is reflected in another. Take, for example, ice cream manufacture and cherry packing.

To meet the high quality and sanitary standards of the ice cream industry, a cherry packer not only installed germicidal lamps in his plant (FI, Oct., p. 83) but more recently has adopted an ultra-modern bulk container.

Howard Black Cherry Co, Traverse City, Mich., is packing cherries in steel drums lined with polyethylene film. This liner is brought over the rim of the drum, and a sheet of the same material is placed over the top of the fruit after the drum is filled. The film not only keeps the fruit from contacting the metal, but forms a sealing gasket when the lid is placed on the drum.

No more worry about quality being impaired by the container.

Putting Smell Back as Flavor

At the Eastern Regional Research Laboratory, a lot of good work has been done on the recovery of flavor essences lost in aromas escaping from heat-processed foods, such as apple and grape juices. Now ERRL is investigating the recovery of aromas from jam, jelly and preserve cookers.

This technic of saving the smell and putting it back to enrich the flavor merits a lot of attention from food processors—including those making frozen concentrated orange juice.

Odds Improved in Quality Gamble

Increased capacity and lower costs often are considered the benefits of mechanizing food processing operations. But there is another important factor. It is demonstrated in the new Marshmallow Fluff plant of Durkee-Mower, Inc., at East Lynn, Mass. There, mechanization has reduced chances of human error in processing from 15 to 1.

'Tis cheaper to shoot craps than to gamble with the quality of your product.

Hors d'Oeuvres

■ Newcomer to frozen orange concentration predicts that by 1955 the sole function of the fresh orange will be its decorative use as a centerpiece for your dining room table. You might want to hold onto a few apples and bananas, though, just in case there's a short orange crop.

■ A survey convinces *Parents Magazine* that "American families with children spend more for food than do families without children." Anyone want a survey to find out why?

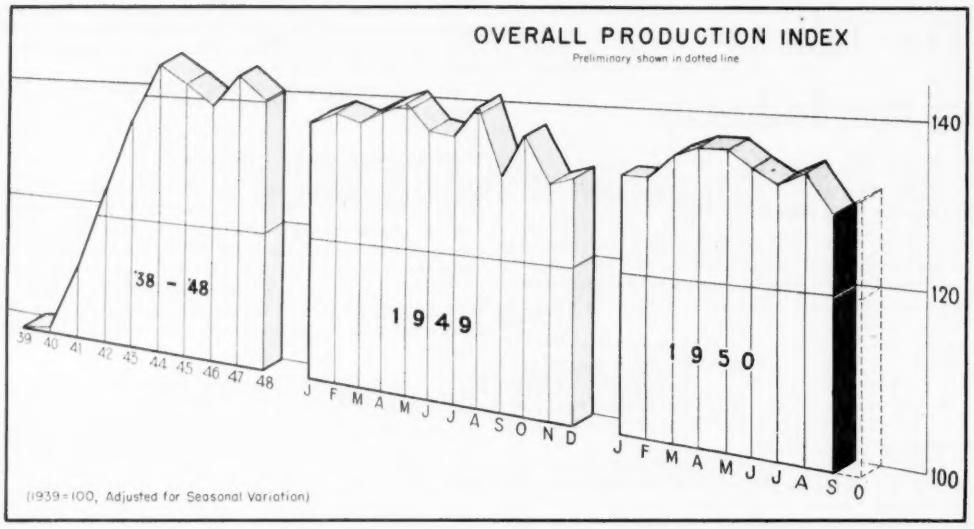
■ Fertilizer bags made of printed cotton fabrics have the same re-use value as flour and feed bags, according to USDA. Question is, will the dresses, curtains, and other finery made therefrom, have the same *social* value?

■ Why do so many Irish-Americans still dislike the British? What kept British workers from getting pay increases? What inspired Communism 2,000 years ago? Why were many pre-Inca Peruvians slain for sacrifices? British authority says the answer is: Potatoes. And we think they're giving *us* trouble!

■ British "kippers"—4,000,000 of them in 80,000 cases—were recently shipped to New York to "make an assault on the American breakfast table." Last we heard the table was holding its own.

■ It's very hard to boom in print, but we'd like to boom to all of you, A MERRY CHRISTMAS. **J.A.J.J.**

FI Index and Outlook


OVERALL PRODUCTION INDEX
Preliminary shown in dotted line
38 - 48
1949
1950
39 40 41 42 43 44 45 46 47 48
J F M A M J J A S O N D
J F M A M J J A S O
140
120
100
(1939=100, Adjusted for Seasonal Variation)

Meat Packing Leads Upswing In Processed Food Output

Cattle numbers are increasing rapidly . . . Demand for other manufactured foods is rising with incomes

PROCESSING ACTIVITY rose in October and continued strong in November. Preliminary reports place the October index at 132, and November promises to be slightly higher.

The meat packing industry has been particularly busy. Hog slaughterings are well above last year because of strong retail demand for meat and high prices to the farmer.

Packers' prospects for 1951 are equally bright. The Department of Agriculture predicts another 5 percent increase in hog marketings. And cattle numbers are also increasing rapidly—more rapidly than the number coming to market indicates. Farmers are holding back steers and fattening them, to be marketed at heavier weights next year. The fear of price declines, which has restricted cattle raising for the past few seasons, appears to be vanishing. Some agricultural economists predict a 25 percent increase in beef production over the next five years.

Much depends, however, on the relationship between meat prices and feed prices. Right now, feed is plentiful and meat prices are evidently headed way up. But the government might step in next year with meat price ceilings. Then if corn supplies tightened, farmers might be discouraged. A few experts have come out for higher meat price supports, to assure continued expansion of beef and pork production. But whatever happens later, there'll be more meat in 1951. Much of it is on the hoof right now.

The Department of Agriculture expects increasing output of other foods in 1951. In the canning field particularly, processors' stocks are lower than usual for this season. The result will probably be a whopping increase in next year's fruit and vegetable packs. Of course, weather must be favorable. But so far as demand goes, there's every incentive for farmers and processors to turn out more food.

Buying Power Strong

There is still some talk about business receding from current boom levels. The panic buying that followed the start of war in Korea has definitely subsided. Food prices have dipped a little because of the seasonal increase in supplies. And there's the worry that cutbacks in the automobile and construction industries may reduce consumer buying power.

Actually, total consumer income is still increasing. Wage boosts being granted in one industry after another more than compensate for recent increases in taxes. In fact, the worker group as a whole will have more money to spend in coming months, even if there are some unemployed in the auto and homebuilding fields. And that means stronger demand for food.

The dominating fact in the food outlook is that prices are high and going

At a Glance—

(1939 = 100, with all figures adjusted for seasonal variation)

	Sept. 1950	Aug. 1950	Percent Change	Year Ago
Baking	124	125	—1	128
Butter	73	74	—1	80
Canning	140	146	—4	145
Cheese	162	162	0	172
Confectionery	147	144	+2	147
Evap. Milk	141	137	+3	129
Flour	106	105	+1	114
Ice Cream	167	174	—4	166
Malt Liquors	182	167	+9	136
Margarine	278	367	—24	302
Meat Products	151	150	+1	146
Sugar	103	108	—5	88

higher. Rising incomes make people willing to pay them. This situation affects production differently in the various divisions of the food industry. As people earn more, their preference often shifts to high priced foods. So a boom of the type we are having helps the market for some foods at the expense of others.

Consumer Pattern

For example, high consumer incomes will help the trend toward frozen fruits, vegetables and juices at the expense of cheaper canned items. Cake and cookie sales should improve. But bread and flour sales will probably not be much changed. High priced candies will pick up more than nickel bars.

Price changes are already affecting the pattern of production in the dairy industry. Farmers' price for butter rose from 55.7c. per pound in June to 58c. (average) in October. But wholesale milk prices went up more—from $3.45 a hundred pounds to $4.23 in the same period. And retail milk sales are increasing, despite recent price increases.

More Bottled Milk

As a result, more milk is being marketed in liquid form, and less is being made into butter. This trend is likely to continue, since the market for fluid milk can be greatly expanded in a period of high consumer income. More milk will go into ice cream, too—a relatively high priced product—and less will go into butter and cheese to be piled up in government storage through support purchases.

The dairy industry is indirectly affected by high meat prices. Some cows will be slaughtered for meat. And that will prevent any significant increase in milk production next year. This year's total will hit 120,000,000,000 lb. Output per cow is almost as high as it can be pushed.

Altogether, the improved market for milk, cream and ice cream is expected to provide the dairymen with their best year in some time. The only danger, once again, is price ceilings, for costs are expected to go up also.

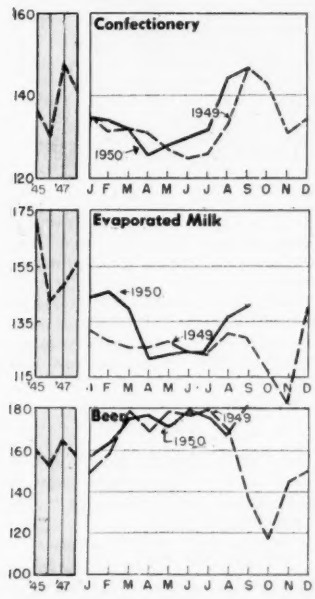
At this writing, price controls still look at least six months off, and may be longer. The real test period for food prices will come in the spring, when meat supplies are seasonally low. Then, if prices jump too far, public opinion may force Congress to act.

Watch Prices

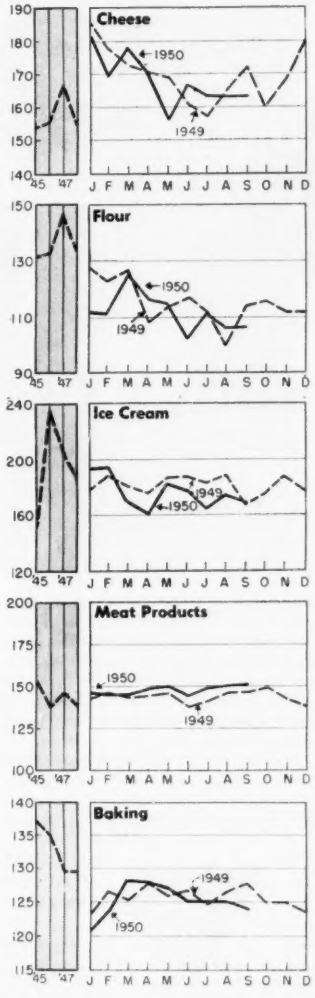
How such controls would affect food production generally is an unanswerable question. Holding prices down would theoretically broaden the market for food as incomes rose. But in practice, controls might be spottily enforced. And if some items are controlled, while other prices rise, that will disrupt the normal pattern of food production.

Whether the shift to high priced foods continues, or whether price controls appear and change things, prices are the thing to watch in coming months. They will govern the shape of the food production charts in the first part of 1951.

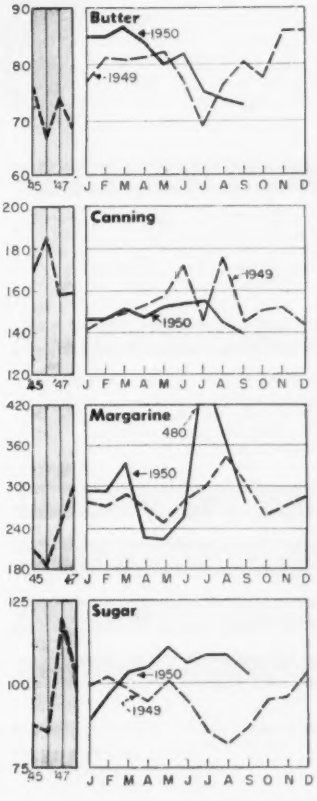
RISING ▲



STEADY ➔



FALLING ▼



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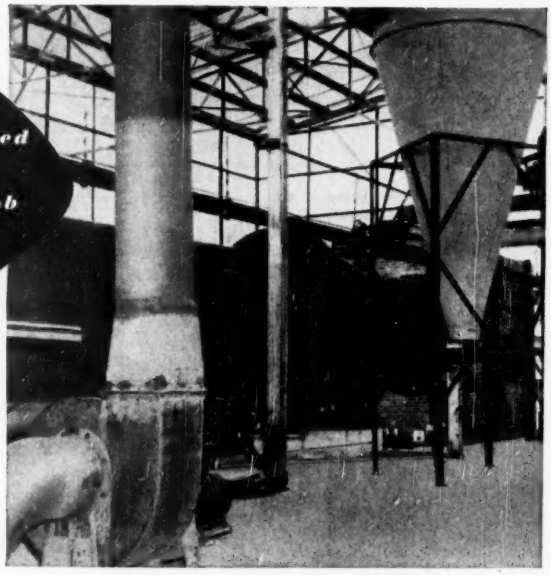
CREATIVE DRYING ENGINEERING

How a new Louisville Dryer can lift production by 4½ times...profits by $11.54 per ton

Designed to do your job best!



FORMER DRYER

Installed cost	$9,000.00
Annual production (tons)	450
Drying cost per ton	$18.60
Capacity, lbs. dried product per hour	600

LOUISVILLE DRYER

Installed cost	$36,000.00
Annual production (tons)	2,025
Drying cost per ton	$7.06
Capacity, lbs. dried product per hour	3,500

EXTRA PROFIT PER TON DRIED WITH LOUISVILLE DRYER $11.54

Don't call in a "boy"—when the job is man-size! Small-production dryers *can* cost you big money—as the performance comparison figures shown here prove clearly. Here's black-and-white proof that it pays to have a Louisville engineer check over your dryer capacity.

A study of your problem may show that a larger-capacity Louisville dryer—especially designed for your purpose—will turn out 4½ times more production—with little if any increase in your labor costs. In fact, labor savings alone may spell the difference between a good profit or a sagging loss.

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What Washington Thinks

BREAD RULES CRITICISED—Federal Security Administrator finds himself confronted with two basic criticisms of the tentative standard of identity for bread. In one case, certain marketers of chemicals proposed as bread softeners raise the issue as to whether the Administrator has not judged the suitability of their product more on the basis of criticism by competitors than on the basis of safety and usefulness. In another instance the administrator is chided for having ignored the record of the hearing and based his new tentative bread standard on extraneous misunderstanding of fact.

In this second case a proposed optional ingredient was omitted simply because there was no *new* evidence introduced. This action, it is charged, assumes that the Administrator can change his mind as to the early part of the record without introduction of any new evidence, despite the fact that earlier proceedings had led to an official finding. The propriety of such change of mind without any new evidence is questioned. It is very clear that the new bread standards are not going to go into effect at all soon unless they are adopted in a form that is likely to result in serious court challenge. In fact, standards-making seems to have become a highly hazardous proceeding for the officials involved.

TAX AMORTIZATION—National Security Resources Board has set up regulations and prepared forms by which industrial management can secure authorization for amortization of new construction in five years. Essentially, the procedure requires that the new investment be for an emergency facility, which is certified as being essential for defense purposes. The large advantage to the industrial taxpayer in such a rapid write-off promises a great many cases for review. The advantage will be particularly important for companies whose taxable income will otherwise grow rapidly and produce large penalty if an excess profit tax is imposed, as generally forecast for this winter.

FRENCH ALCOHOL—Office of Rubber Reserve bought 112,000,000 gal. of ethyl alcohol from France to use in making butadiene for the rubber program. Most folks around Washington wonder why this alcohol, which cost the taxpayers a handsome sum at the United States chemical plants, was bought. Why is it that surplus potatoes, otherwise useless, soft grain which did not mature, or low grade corn now owned by the Government in storage were not used instead as alcohol raw material? That is a question which is likely to be debated violently and with full show of partisanship during the next session of Congress.

HIRE THE HANDICAPPED—Many times plant executives are very reluctant to hire a seriously handicapped person. A concerted government effort is being made to eliminate that prejudice. Perhaps food plant bosses will soon find it expedient to be converted to the new social doctrine. Obviously every source will shortly have to be tapped if the number of workers available continues to decline.

THE WELFARE STATE—Any food technologist who doesn't like the social trends of Washington will find both guidance and support for his arguments in a little booklet, *The Welfare State and the State of Human Welfare,* recently published by the Chamber of Commerce of U. S., Washington 6, D. C. It costs 50c. for a single copy of this report of a study by the Chamber Committee on Economic Policy. Most individualists will get more than 50c. worth of satisfaction from a single hasty reading.

FILTH-LADEN—In reporting August legal operations of Food & Drug Administration it is noted that every court case that reached a decision had to do with foods containing insect fragments, or with other unfit food products. One might infer that anyone who sells clean and proper food will have no trouble with F&DA. It also looks as though close quality control from a sanitary point of view is a profit-making responsibility of the food technologists. Certainly it is much more pleasant to spend one's time on better technology than it is fighting food-filth cases.

TAX PAID RESEARCH—Scientists have been looking for government support in their investigations in many cases. That is to be expected if the government is a party to the project. But secondary difficulties arise if it is really industrial research for which tax funds are asked. Warning on this subject has been given by a number of long-vision scientists. That warning seems well justified in view of the new plans on patent policy which are to be developed by government Patents Board, under the chairmanship of Dr. Archie M. Palmer.

MOLASSES EMBARGO—New demand for alcohol from which to make rubber chemicals has made inedible molasses very scarce. The Department of Agriculture is worried lest the supply for feed use be inadequate. They have, therefore, placed an embargo on export of molasses. Incidentally, it is of interest to note that about 225,000,000 gal. of molasses will be used as stock feed this year.

PROSPECTIVE DEMAND—The "1951 Outlook" as seen by the Bureau of Agricultural Economics is for "a very strong demand for most farm products." This forecast, which seems believable in the light of the present economic up trend, implies also the largest demand ever experienced for the more highly processed foods. It can be expected that when payrolls are big, there will also be greater buying of foods of high unit value.

PROFIT FROM BAGS—The Department of Agriculture reports that fertilizer bags have a very substantial re-use value. Bags used as food containers are less likely to be salvaged, but may have comparable advantage either in industry or in agriculture. Now that all such packaging material is so scarce, it is worth while to find out whether a re-use of bags, and perhaps of other containers, may not slightly offset increasing costs of the new container. Even if the profit goes to the customer, it is worth while because it becomes a sales argument.

FREEDOM TO CHOOSE—A number of groups, trying to restrain bureaucratic development under the guise of "defense", have recently been attacking regimented economy. Collectively, these agencies seem to be staging a demand for a fifth freedom—freedom to choose. In view of the multitude of new federal regulations, they seem to have a real area for activity, but probably an uphill battle to fight.

—R. S. McBride, Washington, D. C.

this v-belt inventory is unnecessary

Standardize on Veelos—the adjustable v-belt—and *eliminate* the storage problem, the control problem and the "tied-up" money problem that is usual in maintaining a full stock of endless v-belts.

this stock of VEELOS replaces up to 316 sizes of endless v-belts

Four reels of Veelos can take care of *every* v-belt need in the O, A, B and C widths. V-belt control is simplified, only a minimum storage space is needed and inventory-dollars are kept at rock bottom.

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Veelos supplies vibrationless, full power delivery and can be simply and easily adjusted to maintain uniform tension on all belts. Veelos can be installed quickly . . . even without dismantling outboard bearings.

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Made in all widths in three types: regular, oil-proof, static conducting. Also double V in A and B. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. VEELOS is known as VEELINK outside the United States.

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THE LINK
V-BELT

Some use Christmas bells...

Some use Christmas holly...

Some use a fat Santa Claus,
Round, red, and jolly...

But our wish takes all of them,
See? They're all here –
To say...

MERRY CHRISTMAS!

And a **BRIGHT GOOD** next year!

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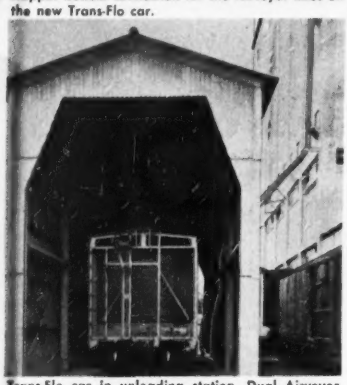
Handling flour in bulk

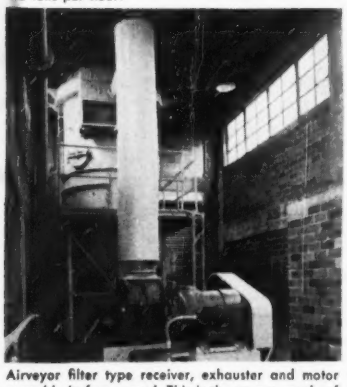
outmodes all other methods

IT'S ECONOMICAL—SAFE—SANITARY

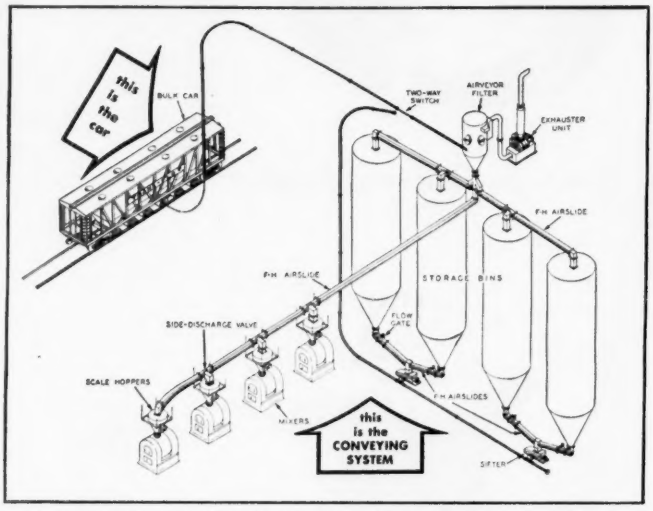
Hopper bottom connection for the Airveyor lines on the new Trans-Flo car.



Trans-Flo car in unloading station. Dual Airveyor conveying lines pass through shed wall and continue up the side of the building to storage or to mixers. Each has a capacity of 20 tons per hour, can be combined for a total unloading capacity of 40 tons per hour.



Airveyor filter type receiver, exhauster and motor assembly in foreground. This is the power supply of the Airveyor system, furnishing a continuous flow which draws flour from the car into the self-cleaning filter. Filter discharges into storage or process bins through a rotary air lock.



Typical Fuller System which uses the Airveyor for unloading flour from the Trans-Flo car to storage bins and the Airslide to reclaim it from storage to mixers in the bakery.

Cooperating with General American Transportation Corp., Fuller has developed a new method of bulk handling of dry pulverized and granular food ingredients . . . in-transit and in-plant. It meets all sanitary requirements of Federal, State and Municipal Agencies — it reduces unloading and conveying time—keeps infestation at the minimum.

Handling at the mill, in-transit and in-process is cleaner and more sanitary. There's no dusting. It's more economical because bags and barrels are eliminated as well as transportation of this tare; man hours are cut; there's no material waste.

Other than the blower and feeder, there are few moving parts; maintenance is reduced, reliability improved. Sharp turns and pockets where flour or similar products might accumulate and infestation occur are eliminated. The system can be blown completely free of all lading. Retention of all visible dust is assured. The only power needed is a source of low pressure air.

It will pay you to investigate the possibilities of pneumatic foodstuff handling in your plant. It improves quality, it's economical, efficient, safe and sanitary. A letter will bring a Fuller Engineer who will analyze your present conveying systems without obligation to you.

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you can IMPROVE the flavor of your products with MM&R SPICE OILS, the MODERN Method of FLAVOR CONTROL

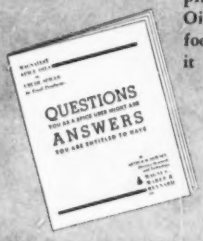
It's true as you're reading this that no other method of flavoring can give your products *all* the advantages of liquid Spice Oils . . . and no other Spice Oils can match the purity, the uniformity, the *economy* of MM&R MAGNATEST Spice Essential Oils.

It's easy to *test* the advantages of MAGNATEST Spice Oils in a sample batch. For full information, write the MM&R Technical Service Dept. today.

13 reasons why MM&R MAGNATEST SPICE OILS WILL GIVE YOU BETTER RESULTS

1. more economical (flavor **more** batches at **lower** cost per batch)
2. make it possible to flavor your product uniformly
3. cannot cause discoloration
4. do NOT mold
5. release 100% of flavor immediately
6. prevent introduction of rodent excreta, hair or pellets, insects or insect fragments, etc.
7. always constant in flavor value
8. easy to measure in exact quantities
9. take up less storage space than crude spices or flavored salt or sugar
10. decrease freight expense
11. prevent losses due to exposure during storage
12. easy to blend
13. prevent overflavoring of prepared food products during shelf life

FREE! An important technical paper—"Questions and Answers", that will give you a clear and complete picture of the place of Spice Essential Oils in the flavoring of food products. Write for it now!



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Installation of Pneumatic top closure equipment at new Houston Bakery of National Biscuit Company

The easy opening RITZ CRACKERS carton is handled on PNEUMATIC MACHINES

PACKAGING of such a tremendous family favorite as RITZ CRACKERS is in the nature of a colossal assignment. You've got to have good protection for such a perishable product. You've got to have a carton that opens easily, that's attractive—and strong enough to stand up under plenty of handling. And you've got to turn them out in a hurry!

It's no trick at all for National Biscuit Company and their Pneumatic packaging equipment. And it's the same story with leading producers of all kinds of packaged products the country over. You'll find more of them using Pneumatic machines than any other kind. Why? Because of their smooth, speedy, trouble free performance —and because, when all is said and done, the money-saving efficiency of Pneumatic machines means—"lower cost per container".

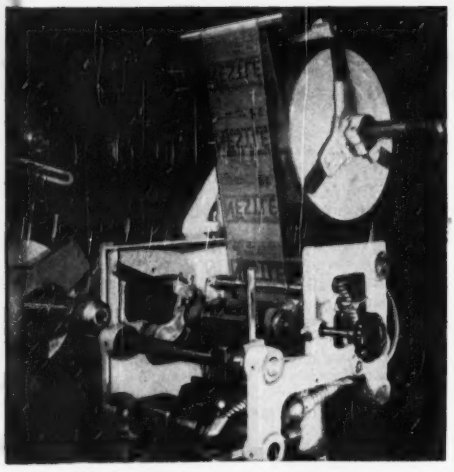
PNEUMATIC SCALE CORP., LTD., 91 Newport Avenue, Quincy 71, Massachusetts. Branch Offices in New York, New York; Chicago, Illinois; San Francisco and Los Angeles, California; Seattle, Washington.

POWDER FILLERS

VACUFLOW POWDER FILLING MACHINES are now manufactured and sold by Pneumatic Scale Corp., Ltd. Rotary and single head units are available for accurate, dustless handling of freeflowing and non-freeflowing materials. Speeds range from 20 to 300 per minute. Pneumatic invites your inquiries on powder filling problems.

PNEUMATIC **PACKAGING AND BOTTLING MACHINERY**

faster packaging, hairline and less waste!



SAVES WRAPPING MATERIAL!

At the Peter Cailler Kohler Swiss Chocolate Co. plant in Fulton, N. Y., Nestle chocolate bars are quickly wrapped in this packaging machine. Here, G-E cut-off register control has meant a big saving in wrapping material, plus an increased production rate, over the mechanical method previously used, which often wasted material through poor register and periodic jams.

G-E register controls—cut-off, side, and color—boost packaging speed, maintain pin-point accuracy, cut waste due to rejects!

In these days of self-service retailing, your product's "buy-appeal" is far greater when you package it in a neat, attractive wrapper—precision printed and cut with General Electric register controls. Automatic in operation, these electronic aids for food packaging also give you these advantages:

Increased production through automatic operation and higher machine speeds. *Lower material and labor costs* which often justify the equipment's entire cost. *Low maintenance* due to few moving parts, with automatically-maintained register eliminating need for constant visual inspection. *Easy operation* that requires no special training, enables operators to devote more time to other duties. *Maximum flexibility,* permitting controls to work equally well on paper, cellophane, metal foil, or cloth.

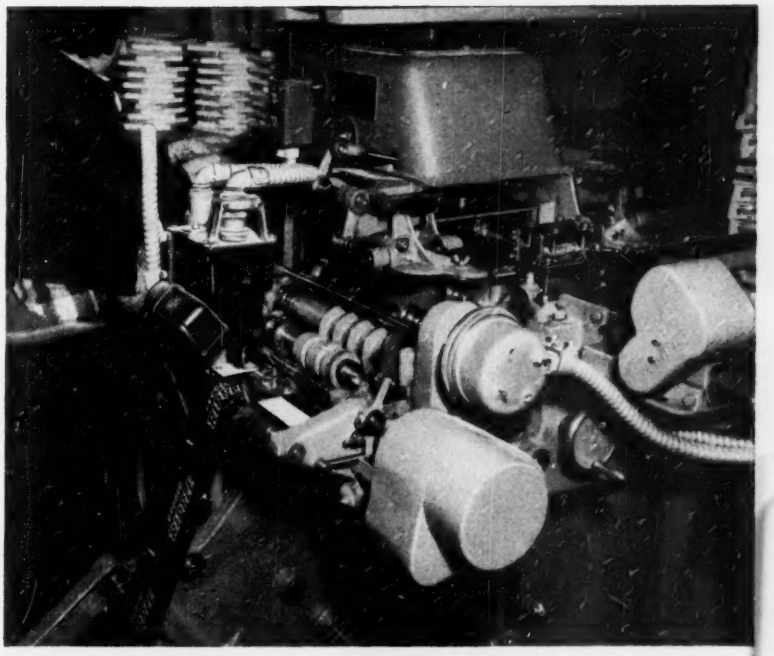
Use *cut-off register control* for your wrapping operations, *side-register control* for your slitters or wherever the web must be guided, and, if you do your own printing, *color-register control* for your web-fed gravure or offset presses. Ask your G-E food industry specialist how to apply these G-E register controls to boost output, cut costs in packaging *your* food products. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

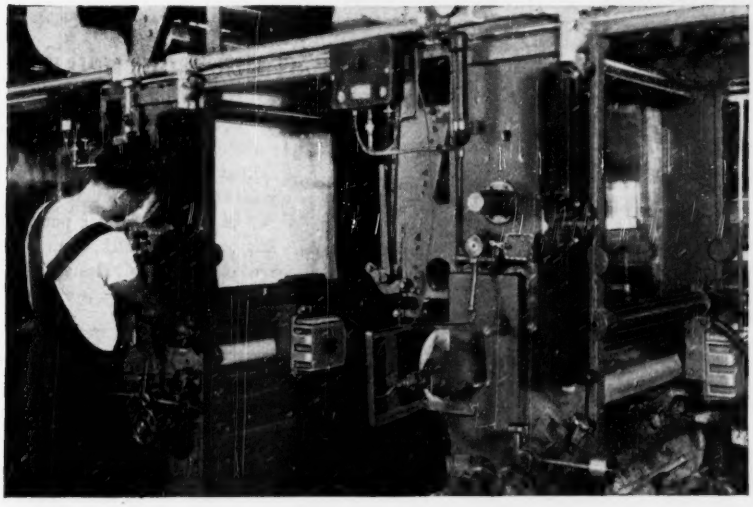
GENERAL ELECTRIC

652-7

SAVES MANHOURS!

Where eight people were once needed at the Golden Nugget Sweets, Ltd., plant in San Francisco to hand wrap and box candy bars, only two have been needed since the installation of a wrapping machine with G-E cut-off register control. Since register is maintained automatically, the control eliminates the need for constant visual inspection. Moreover, it permits wrapping as many as 115 candy bars per minute while cutting the preprinted paper roll to exact lengths and precisely positioning the printed design. Electronically controlled, this G-E device has few wearing parts, requires but little maintenance.





SAVES PRODUCTION TIME!

At Milprint, Inc., in Milwaukee, which prints multi-color wrappers on a continuous roll for use by food packers, G-E color-register control has permitted a substantial increase in press speeds. Close register is held on this rotary gravure press even on such difficult materials as cellophane, pliofilm, and cellulose acetate. As a result, this company calculates the saving in rejects will more than pay for the G-E equipment within a year.

GE

REGISTER CONTROLS for food packers

49 HYSTER LIFT TRUCK DEALERS provide SERVICE and PARTS in U. S. and Canada

ALASKA
Northern Commercial Company, Seattle
ATLANTA, GA.
Wrenn Brothers
BALTIMORE, MD.
McCall-Boykin Co., Inc.
BIRMINGHAM, ALA.
S & T Equipment Co., Inc.
BROOKLYN, N. Y.
A. S. Rampell
BUFFALO, N. Y.
Rapids Handling Eqpt. Co. of Buffalo, Inc.
CALGARY, ALTA.
A. R. Williams Machry. Western, Ltd.
CHARLOTTE, N. C.
Wrenn Brothers
CHICAGO, ILL.
Hyster Company
CINCINNATI, O.
Speer & Company
CLEVELAND, O.
Morrison Company
DALLAS, TEX.
C. H. Collier Co., Inc.
DENVER, COLO.
King & Kringel Machry. Corp.
DETROIT, MICH.
Bentley & Hyde
HALIFAX, N. S.
A. R. Williams Machry. Co., Ltd.
HONOLULU, T. H.
Electric Steel Foundry Co.
HOUSTON, TEX.
C. H. Collier Co., Inc.
INDIANAPOLIS, IND.
C. H. Ellis Co., Inc.
JACKSONVILLE, FLA.
Aichel Steel & Supply Co.
KANSAS CITY, MO.
Machinery & Supplies Co., Inc.
LOS ANGELES, CALIF.
Hyster Company
LOUISVILLE, KY.
Embry Brothers, Inc.
MEMPHIS, TENN.
Hyster Co. of Louisiana, Inc.
MILWAUKEE, WIS.
J. P. Waite, Inc.
MINNEAPOLIS, MINN.
W. S. Nott Co.
MOBILE, ALA.
S & T Equipment Co., Inc.
MONTREAL, P. Q.
A. R. Williams Machry. Co., Ltd.
NEW ORLEANS, LA.
Hyster Co. of Louisiana, Inc.
NEW ROCHELLE, N. Y.
Eastern Ind. Sales Co., Inc.
OTTAWA, ONT.
A. R. Williams Machry. Co., Ltd.
PEORIA, ILL.
Hyster Company
PHILADELPHIA, PA.
Rapids Handling Eqpt. Co. of Philadelphia, Inc.
PHOENIX, ARIZ.
Equipment Sales Co.
PITTSBURGH, PA.
Equipco Sales Co.
PORTLAND, ORE.
Hyster Sales Co.
RICHMOND, VA.
Richmond Auto Parts, Inc.
ROANOKE, VA.
Richmond Auto Parts, Inc.
ROCHESTER, N. Y.
Rapids Handling Eqpt. Co. of Buffalo, Inc.
ST. JOHNS, N. F.
City Service Co., Ltd.
ST. LOUIS, MO.
Shipping Utilities
SALT LAKE CITY, UTAH
Arnold Machry. Co., Inc.
SAN FRANCISCO, CALIF.
Hyster Company
SEATTLE, WASH.
Hyster Company
TORONTO, ONT.
A. R. Williams Machry. Co., Ltd.
UTICA, N. Y.
French Mill Supply Corp.
VANCOUVER, B. C.
A. R. Williams Machry. Western, Ltd.
VICTORIA, B. C.
A. R. Williams Machry. Western, Ltd.
WINNIPEG, MAN.
A. R. Williams Machry. Western, Ltd.
YUKON TERRITORY
Northern Commercial Company, Seattle

EVERY HYSTER DEALER IS A LIFT TRUCK SERVICE AND PARTS STATION... He has factory-trained mechanics skilled in maintenance and repair. He has an adequate supply of genuine Hyster parts. His service is quick, courteous, efficient on all Hyster lift trucks:

Model	Capacity	Model	Capacity
HYSTER 20	2,000 lbs.	M STRADDLE TRUCK	18,000 lbs.
HYSTER 40	4,000 lbs.	MH STRADDLE TRUCK	30,000 lbs.
HYSTER 75	7,500 lbs.	KARRY KRANE	10,000 lbs.
HYSTER 150	15,000 lbs.		

—and on these HYSTER *Salsbury* TURRET TRUCKS:

Model	Capacity	Model	Capacity
CARGO PALLET	4,000 lbs.	PLATFORM TUG (Towing)	4,000 lbs. 20,000 lbs.

Call your nearest Hyster dealer when you need fast service and parts delivery.

HYSTER COMPANY

THREE FACTORIES

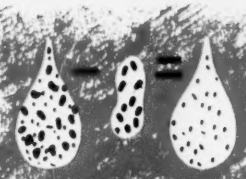
2902-35 N. E. CLACKAMAS ST... PORTLAND 8, OREGON
1802-35 NORTH ADAMS STREET.... PEORIA 1, ILLINOIS
1010-35 MEYERS STREET..... DANVILLE, ILLINOIS

If you make a CONCENTRATE... the SHARPLES DV-2

continuous solids discharge centrifuge

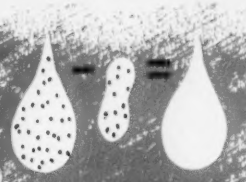
Liquids and solids are automatically and continuously discharged from the Sharples DV-2 through *externally controlled* valves located around the periphery of the bowl. The frequency and duration of valve opening can be accurately controlled as desired for varying conditions. The flexibility of this new centrifugal tool equips it to meet a wide variety of processing needs.

can



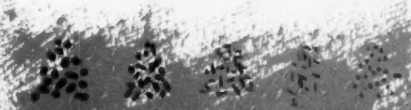
Remove solids of practically any desired particle size from the liquid.

or



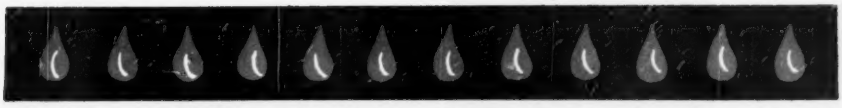
Produce a clear serum by removing all pulp, if desired.

or extract



The amount and size of particles remaining in the concentrate by fractionation or classification.

and



Maintain constant consistency of concentrate regardless of fluctuations of rate, or solids content of feed.

While doing the above, removal of undesirable, insoluble impurities is assured.

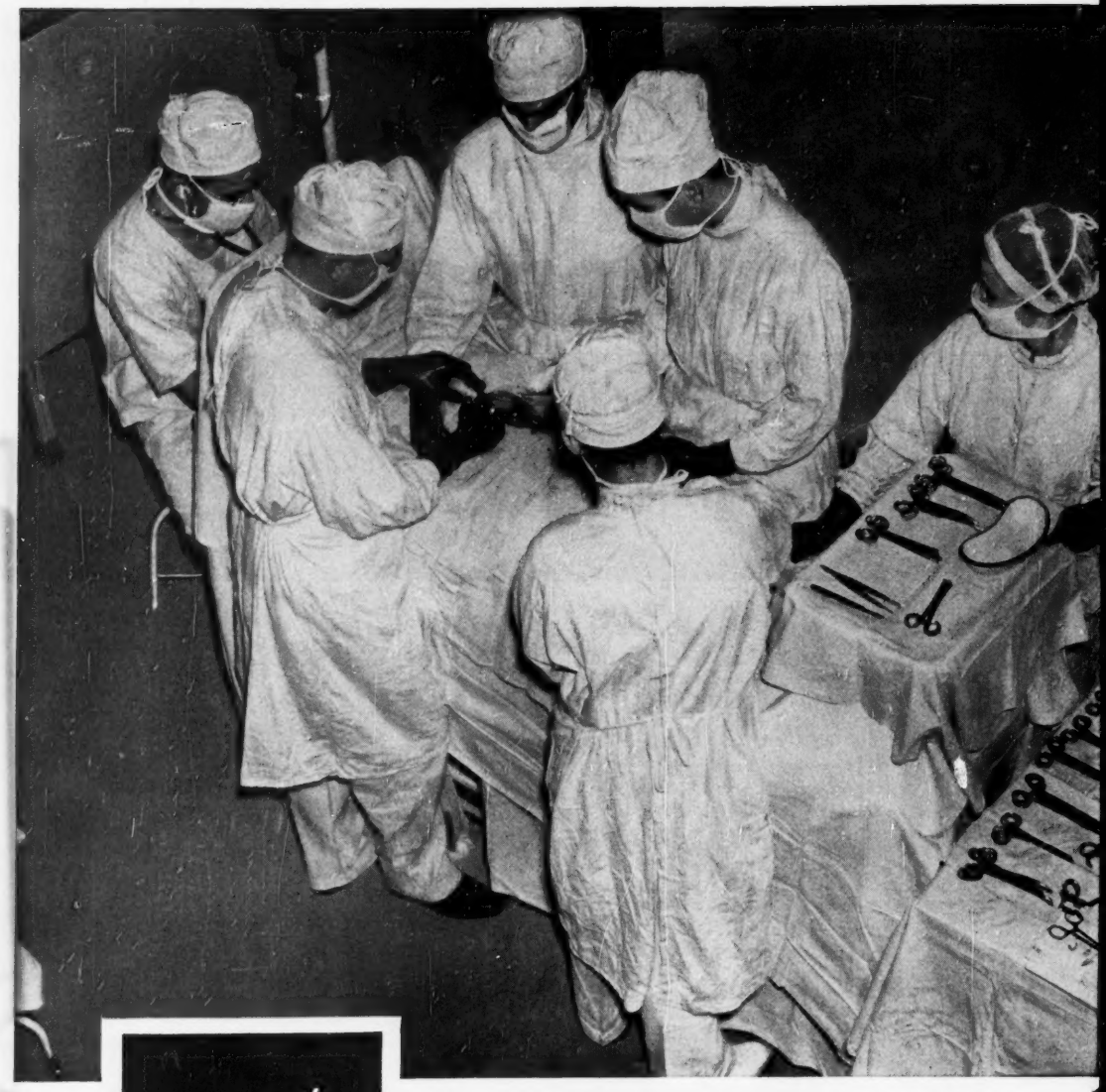
SHARPLES

THE SHARPLES CORPORATION

BOSTON NEW YORK PITTSBURGH CLEVELAND DETROIT CHICAGO
NEW ORLEANS SEATTLE LOS ANGELES SAN FRANCISCO HOUSTON

2300 WESTMORELAND STREET • PHILADELPHIA 40, PENNSYLVANIA

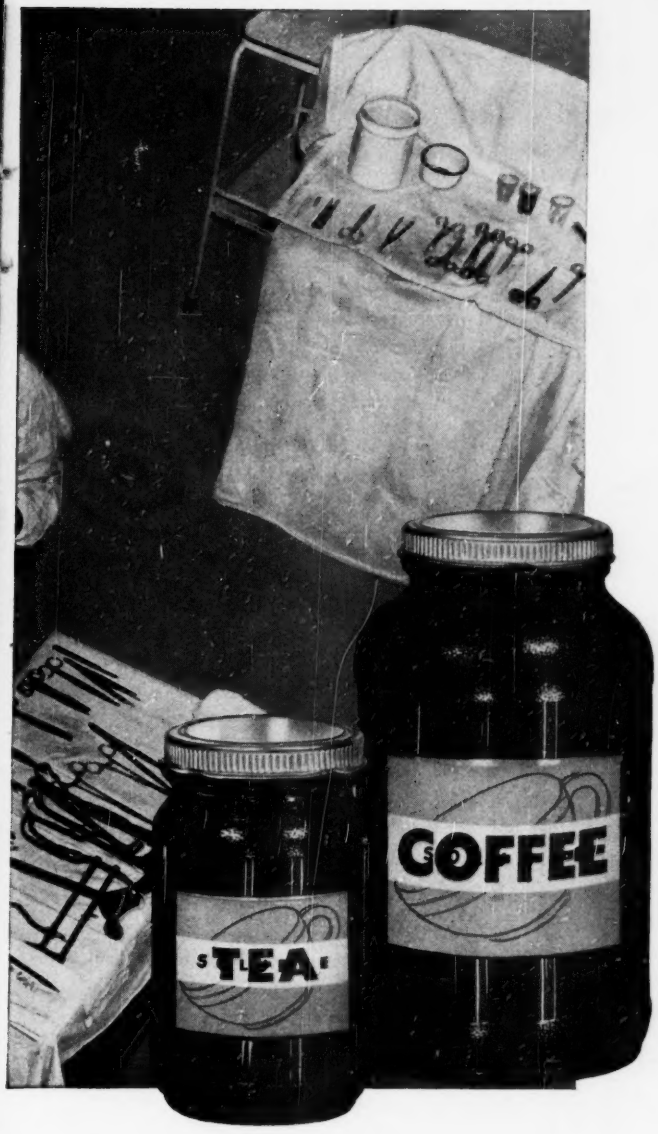
ASSOCIATED COMPANIES AND REPRESENTATIVES THROUGHOUT THE WORLD



When you want the BEST go to the BEST

And for Packaging it's GLASS

The transparent glass package displays your products with all their colorful eye and appetite appeal. High in chemical durability, it does not change their taste or aroma, will not rust, corrode or leak. Easy to open, easy to use, easy to reseal to protect unused portions, it makes the most convenient package. It lends itself to individuality in size and shape, hence is adaptable to any product. Preferred by consumers because it is sanitary and convenient . . . by retailers because of its sales and merchandising advantages. Select your source of supply for glass packages as carefully as you would a surgeon, attorney or other specialist.
Anchor Hocking Glass Corporation, Lancaster, Ohio.



Anchorglass*

SOLUBLE COFFEE AND TEA JARS

Pack your soluble coffee and soluble tea products in strong, durable *Anchorglass* Jars. They are designed especially for ease of handling, easy access to contents, efficient product protection, economy and display in packaging and merchandising your products. *Anchorglass* Containers are the result of carefully selected and controlled raw materials, consistency in manufacture, uniform distribution of glass, accurate annealing, quality control through laboratory tests and regular inspections. They are uniform in height, diameter and finish. But whether you pack soluble coffee, tea or other food products, there are *Anchorglass* Containers in styles, capacities and colors that will meet your requirements.

ANCHOR

AMERSEAL* CAPS

Seal frequently used food products with easy off-and-on *Anchor* Amerseal Caps. A quarter-turn, a simple twist of the wrist and the Amerseal is off. A quarter-turn and it seals again—an ideal closure for soluble coffee, tea and many other products that are opened many times before they are all consumed. *Anchor* Amerseal Caps are adaptable for use with all products requiring a dependable airtight seal and not affected by bacterial decomposition. They are available in 18 sizes from 20 to 120 mm. Let us tell you more about the advantages and economies of *Anchorglass* Containers and *Anchor* Amerseal Caps.

*Trade-Mark

For the BEST in Glass Packaging *it's*

ANCHOR HOCKING

"THE MOST FAMOUS NAME IN GLASS!"

stainless steel is a family affair

There's more than just one type of stainless steel . . . because *stainless* applies to a family of steels. And in order to get the best possible results from stainless in your application, the *right* analysis must be used.

That's why Crucible, a pioneer in the development of this specialty, offers you the services of an alert staff of metallurgists to help you with your stainless application problem.

Crucible's half century of specialty steel leadership is built on a strong foundation of service to Industry . . . with attention to detail . . . whether the order is in tons or pounds. From the ground up, Crucible designed and put into operation one of the first integrated mills built specifically to hot and cold roll stainless steel. This $18,000,000 addition gives Crucible facilities to provide industry with stainless in every form.

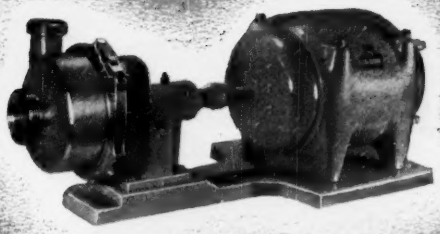
There is no substitute for Crucible's background of 50 years of specialty experience. Let Crucible show you how to apply stainless steels to your products. One call from you puts us to work on your application.

CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

CRUCIBLE first name in special purpose steels

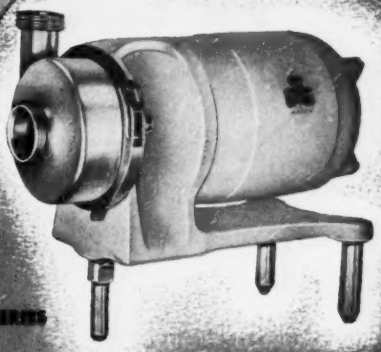
STAINLESS STEELS

STAINLESS • HIGH SPEED • TOOL • ALLOY • MACHINERY • SPECIAL PURPOSE • STEELS



Tri-Clover
STANDARD SERIES
SANITARY TYPE

This model has been designed for the non-agitating, efficient pumping of milk, food products such as diced carrots, cream style corn, tomatoes, applesauce, relish and beverages. It is also practical in breweries and for the pumping of drugs and chemicals in solution.



Tri-Clover
"PUMP KING" SERIES
SANITARY TYPE

Designed for very efficient operation at 1800 and 3600 RPM, and especially where high speeds are required, through heaters, coolers, filters, clarifiers, etc. The 3600 RPM model is especially applicable in the dairy industry where high head and low capacity are essential, and for handling low and medium viscosity liquids in the food processing industry.

Tri-Clover

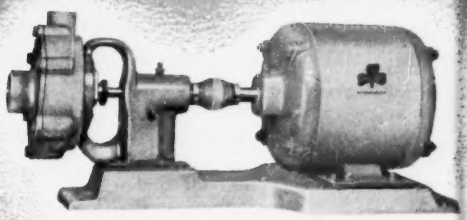
offers you

A COMPLETE LINE

of *non-clogging*

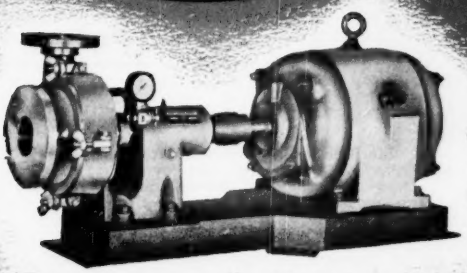
CENTRIFUGAL PUMPS

for dairy and food processing
chemical · bottling
general industrial



Tri-Clover
STANDARD INDUSTRIAL TYPE

A popular model in the general industrial field for pumping water, brine, light oils, chemicals or paints. Available with I.P.S. screwed or flanged connections.



Tri-Clover
HEAVY DUTY
INDUSTRIAL TYPE

This is the model that is in demand to pump lubes, water, brine, light oils, chemicals, paints, brewery products, and for liquids in the food processing field where lines are of heavy I.P.S. type. This model offers quick disassembly feature for ease in cleaning.

WRITE FOR NEW CATALOG

Tri-Clover
MACHINE CO.
Kenosha, Wisconsin

STAINLESS AND STEEL ... FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

TRI-CLOVER PUMPS WILL HANDLE ANY PRODUCT THAT W... FLOW TO THEM

For Cold Film or Foil Use Pervenac Heat Seal Labels

For products packed in film or foil where labels must be sparkling bright, order Pervenac from your printer. This heat seal label is easy to apply, it's free from product stains, it's on to stay.

Ask your film or foil supplier about Nashua's Pervenac or Imac* labels. They've tested them. They know how these labels stick to films they make.

Pervenac labels *like* cold film or foil. Supermarkets, packers and locker plants rate Pervenac highly — the all-purpose label, for frozen fish in cellophane, for poultry processed in Cry-O-Rap bags, for products packed in Reynolds Metal aluminum (Reynolds Pak), for vegetables in cellulose acetate, for fresh meat in Pliofilm.**

*Trade Mark.
Manufactured under patent 2,462,029
**T.M. The Goodyear Tire & Rubber Company

Mr. John Del Torchio, President, Cape Ann Fisheries, Inc., reports, "As the first to use Thermoplastic Labels on Frosted Fillets Packages, Nashua Thermoplastic Labels have given us the following packaging improvements and production savings:

Label line-up on each wrap in exactly the same place, making an eye appealing package, with consumer visibility. Nashua Thermoplastic Labels withstand temperatures from zero to 40 degrees below zero, making a perfect bond with the cellophane over-wrap under all conditions of frozen fillets storage and handling — savings in packaging costs by an increase of 20 to 25 per cent per hour result."

What miracle of packaging goes on here? It's Dewey and Almy's CRY-O-RAP — a vacuum-packed poultry package of a new plastic resin that protects the product from dehydration, weight loss and outside odors while sealing in flavor and bouquet. *Pervenac labels these unique packages.* Dewey and Almy say: "These labels give a great flexibility in that a simple inventory of bags can be used for a wide variety of packages. This is particularly valuable in prepackaged meats for self service store operation. The adhesive bonds the label firmly and positively so that it can go through the CRY-O-VAC process, including the heat shrink, without coming off. The bonding agent holds the label firmly even when the package is frozen and stored at low temperatures."

Roasts, steaks, chops, cold cuts packed in Pliofilm** for eye-appeal, transparency and protection, send meat department sales upwards. And Pervenac is ideal labeling for these packages. The Goodyear Tire & Rubber Company reports: "We have found both Nashua's Pervenac* and Imac* to be two labels which work exceptionally well with Pliofilm** FM-1 meat film.

We always recommend to meat retailers that where they have a heat-sealing label problem, they make sure the stock is either Imac* or Pervenac* as we have uniformly satisfactory results with this label material."

Here's Pervenac CL — a delayed-tack heat seal adhesive label specifically designed for cake and cookie cellophane packaging. Works equally well on single or double phase labeling attachments . . . can be applied before or after wrapping . . . sticks to the job over a wide range of temperature and humidity conditions.

On foil Pervenac pays off, too! Reynolds Metals Company, makers of the Reynolds Pak Aluminum Tray say: "The Nashua people have been very co-operative in assisting us in finding a most satisfactory answer to our Reynolds Pak Labeling problem." Says the packer of Myers Chicken Pie: "We especially like this type of label because it is very quickly applied, is not at all messy and sticks to the aluminum tray paks better than any other label we ever used."

NASHUA GUMMED AND COATED PAPER COMPANY • NASHUA, NEW HAMPSHIRE

NASHUA
MAKES PAPER MAKE MONEY FOR YOU

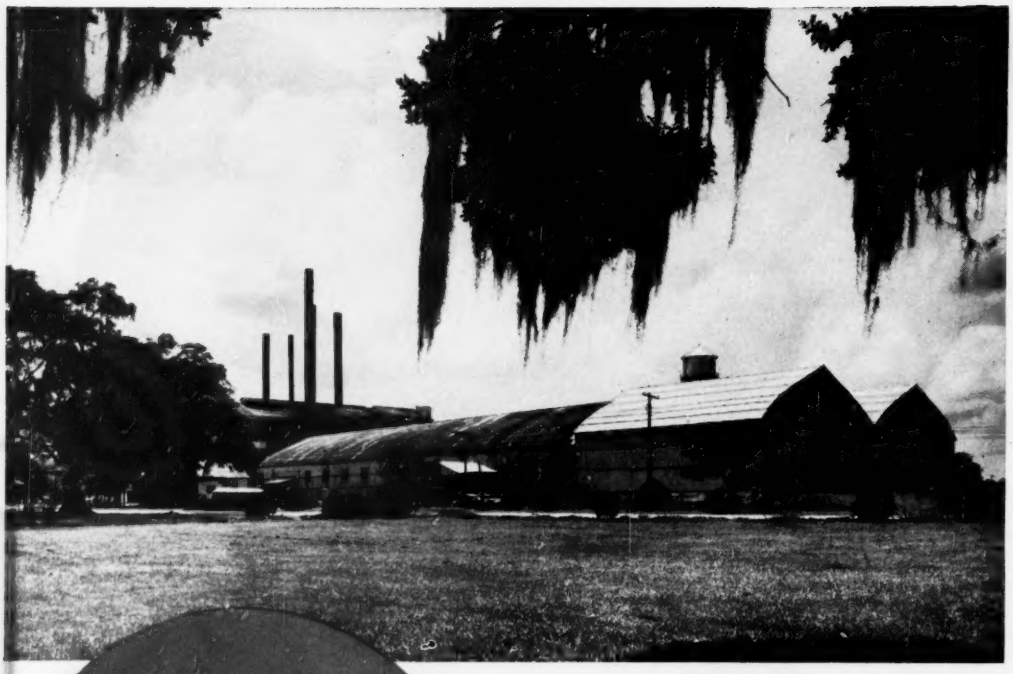
NASHUA HEAT SEAL PAPER DISTRIBUTORS

ALBANY, N. Y.
Hudson Valley Paper Company
ATLANTA, GA.
Whitaker Paper Company
AUGUSTA, ME.
Carter, Rice & Company
BALTIMORE, MD.
Whitaker Paper Company
BOSTON, MASS.
Carter, Rice & Company
John Carter & Company, Inc.
BUFFALO, N. Y.
The Alling & Cory Company
CLEVELAND, OHIO
The Alling & Cory Company
CHICAGO, ILL.
Bradner Smith & Company
Dwight Brothers Paper Company
CINCINNATI, OHIO
Whitaker Paper Company
CHARLOTTE, N. C.
Charlotte Paper Company
COLUMBIA, S. C.
Epes Fitzgerald Paper Co., Inc.
DETROIT, MICH.
Whitaker Paper Company
FARGO, N. D.
The John Leslie Paper Company
GRAND RAPIDS, MICH.
Carpenter Paper Company
GREAT FALLS, MONT.
The John Leslie Paper Company
INDIANAPOLIS, IND.
Indiana Paper Company
JACKSONVILLE, FLA.
Jacksonville Paper Company
LOUISVILLE, KY.
The Rowland Paper Company
MACON, GA.
Macon Paper Company
MIAMI, FLA.
Everglade Paper Company
MILWAUKEE, WISC.
Bradner Smith & Company
Dwight Brothers Paper Company
MINNEAPOLIS, MINN.
The John Leslie Paper Company
MOBILE, ALA.
Partin Paper Company
NEWARK, N. J.
Bulkley, Dunton & Company
NEW HAVEN, CONN.
Bulkley, Dunton & Company
NEW YORK CITY, N. Y.
Bulkley, Dunton & Company
Harry Elish Paper Company
George W. Millar & Company
Whitaker Paper Company
NORFOLK, VA.
Epes Fitzgerald Paper Co., Inc.
ORLANDO, FLA.
Central Paper Company
PHILADELPHIA, PA.
Rhodes Paper Company
D. L. Ward Company
PITTSBURGH, PA.
Whitaker Paper Company
PORTLAND, ORE.
West Coast Paper Company
PROVIDENCE, R. I.
Carter, Rice & Company
RALEIGH, N. C.
Epes Fitzgerald Paper Co., Inc.
RICHMOND, VA.
Epes Fitzgerald Paper Co., Inc.
ROCHESTER, N. Y.
The Alling & Cory Company
ST. LOUIS, MO.
Acme Paper Company
ST. PAUL, MINN.
The John Leslie Paper Company
SAVANNAH, GA.
The Atlantic Paper Company
SEATTLE, WASHINGTON
West Coast Paper Company
SIOUX FALLS, S. D.
The John Leslie Paper Company
SPRINGFIELD, MASS.
Bulkley, Dunton & Company
SYRACUSE, N. Y.
The Alling & Cory Company
TALLAHASSEE, FLA.
Capital Paper Company
TAMPA, FLA.
Tampa Paper Company
WASHINGTON, D. C.
Whitaker Paper Company
WORCESTER, MASS.
Charles A. Esty Paper Company

CARPENTER PAPER COMPANY
Albuquerque, N. M.
Austin, Tex.
Billings, Mont.
Butte, Mont.
Chicago, Ill.
Dallas, Tex.
Denver, Colo.
Des Moines, Iowa
El Paso, Tex.
Fort Worth, Tex.
Grand Island, Neb.
Great Falls, Mont.
Harlingen, Tex.
Houston, Tex.
Kansas City, Mo.
Los Angeles, Calif.
Lincoln, Neb.
Lubbock, Tex.
Minneapolis, Minn.
Ogden, Utah
Oklahoma City, Okla.
Omaha, Neb.
Pueblo, Colo.
St. Paul, Minn.
Salt Lake City, Utah
San Antonio, Tex.
San Francisco, Calif.
Sioux City, Iowa
Topeka, Kan.

EXPORT

MEXICO, CENTRAL AMERICA, SO. AMERICA, SO. AFRICA, and the FAR EAST
American Paper Exports, Inc.
New York City
UNITED KINGDOM, EUROPE, NO. AFRICA and the NEAR EAST
I. J. Seper, 65 Ave. Niel, Paris



For some of the toughest services in industry —

SUPREME SUGAR REFINERY

equips new plant units with

JENKINS VALVES

These Jenkins Valves installed on pipelines serving the pan floor are a few of the 5200 in use at Supreme Sugar Refinery. In addition, several patterns of Jenkins bronze, iron, and steel valves are used to control steam, water, and other vital lines.

There are few tougher proving grounds for valves than sugar mill service. Sticky, sluggish fluids soon seek out any weak spots in design and construction.

Over 5200 valves are maintained in regular service by the Supreme Sugar Refinery of Tallieu, Louisiana. More installations are continually being made as new plant additions go up. Long ago the management learned that, to insure the lasting efficiency required for profitable operation, the *only really safe economy* is to choose the best valves money can buy. For this reason, they standardized on Jenkins Valves.

In fact, Jenkins Valves have been the consistent choice of leading engineers, architects, and contractors everywhere for more and more of the nation's most notable buildings, wherever cost-wise, future-minded planning is the rule. For plant expansion, as well as new plants—large or small; for the commercial and institutional buildings that dominate today's changing skylines, Jenkins Valves are providing an extra measure of dependability, safety, and low maintenance.

Despite this extra value, *you pay no more* for Jenkins Valves. Let the Jenkins Diamond be your guide to lasting valve economy. Jenkins Bros., 100 Park Avenue, New York 17; Jenkins Bros., Ltd., Montreal.

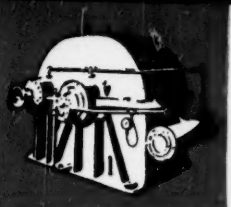
Sold through leading distributors everywhere

JENKINS VALVES

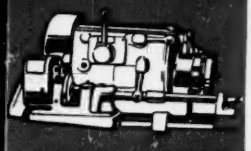
LOOK FOR THE DIAMOND MARK

SINCE 1864 TRADE JENKINS MARK

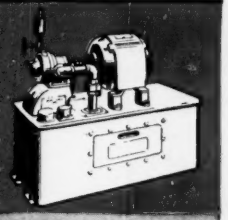
Jenkins Bros.



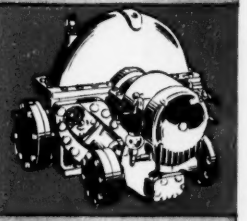
SPEED REDUCER



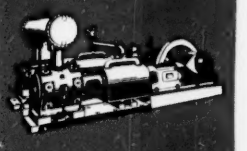
HEAD STOCK GEARS



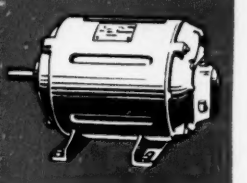
HYDRAULIC SYSTEM



AUXILIARY TURBINE



COMPRESSOR



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A corrosion inhibitor of the most advanced type has been added to all grades of the new STANOILS that benefit by such an additive. This inhibitor prevents corrosion trouble by "plating out" on surfaces that tend to rust. In such severe service as paper-machine and steam-turbine lubrication, new STANOILS have put an end to rust and corrosion troubles.

At the left are shown several types of equipment in which the new STANOILS can save you money and maintenance time. A Standard Oil lubrication specialist will help you find still other applications where versatile STANOILS can replace many special-purpose oils. You can reach this man quickly and easily through your local Standard Oil Company (Indiana) office. Contact him today. Or, if you wish, write: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

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Dressing tables and bacon weighing and packing units are but two of dozens of uses for Republic ENDURO Stainless Steel in the food industries. Other applications—such as kettles, sinks, hoppers, mixing tanks, pails, utensils, sanitary piping, valves and fittings—exist in every phase of food preparation, processing, packing and packaging.

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Among the many ENDURO analyses you will find materials which exactly meet the particular needs of every food processing application. Your equipment manufacturer will be glad to give you all of the facts.

✔ **CHECK ALL 10 ADVANTAGES:** Rust- and Corrosion-Resistance • Heat-Resistance • High Strength • No Metallic Contamination • Sanitary Surfaces • Easy to Clean • Eye Appeal • Easy to Fabricate • Long Life • Low End Cost • *What more can be desired in a material?*

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- **Uniform speed throughout shift,** with trucks handling as much tonnage during last hour as during first.
- **Exceptionally long life**—proved on more than 100,000 heavy-duty jobs.
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Combined, these and other Exide-Ironclad characteristics assure you dependable performance, day after day . . . for years.

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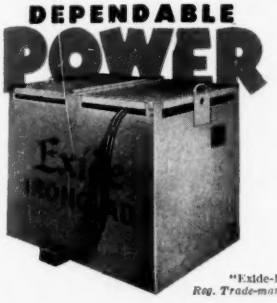

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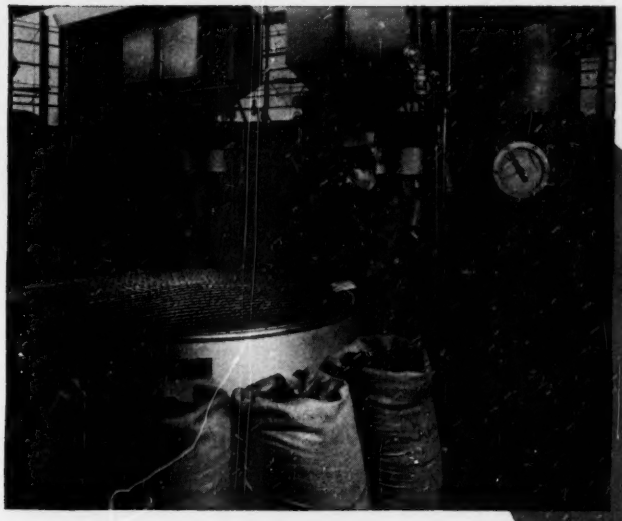
1888...DEPENDABLE BATTERIES FOR 62 YEARS...1950



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. . . with the *ElectroniK*

COFFEE ROASTER CONTROL SYSTEM

COFFEE ROASTERS from coast to coast are enthusiastically adopting the "packaged" *ElectroniK* Temperature Control System to attain the *right color* and the *right flavor* . . . automatically, day after day!

Time-tested and approved in a wide range of installations, this system is setting new high standards for uniform production at top capacity. It can be used for any blend and on any roaster . . . a push of a button starts the cycle and the roast proceeds without further attention.

The system is complete in itself and can be installed with only a minimum of interruption. A practical, on-location demonstration is the best way to prove what it can do for your roasts. And, your local Honeywell engineer is ready to show you how it works . . . call him today, he is as near as your phone!

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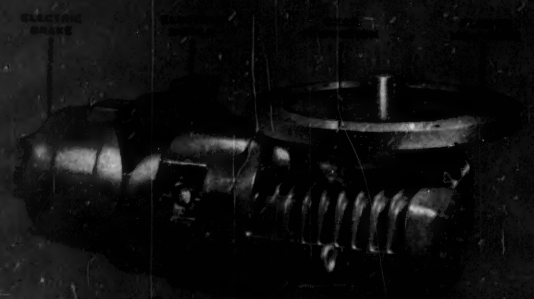
MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS



You can't beat the combination of the RIGHT horsepower, the RIGHT shaft speed, the RIGHT features all in one compact unit that you can use RIGHT where you want it. It's the best way and the easiest way to select your power drives because you purchase one unit, handle one unit in your receiving, production, or maintenance departments . . . set one unit in place and you're ready to go.

Master Motors, available in thousands and thousands of types and ratings (up to 150 HP) give you an enormous selection of integrally built power drives from which you can easily select the combination of features that's just right for each job.

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Select the RIGHT power drive from Master's broad line and you can increase the saleability of your motor driven products . . improve the economy and productivity of your plant equipment.

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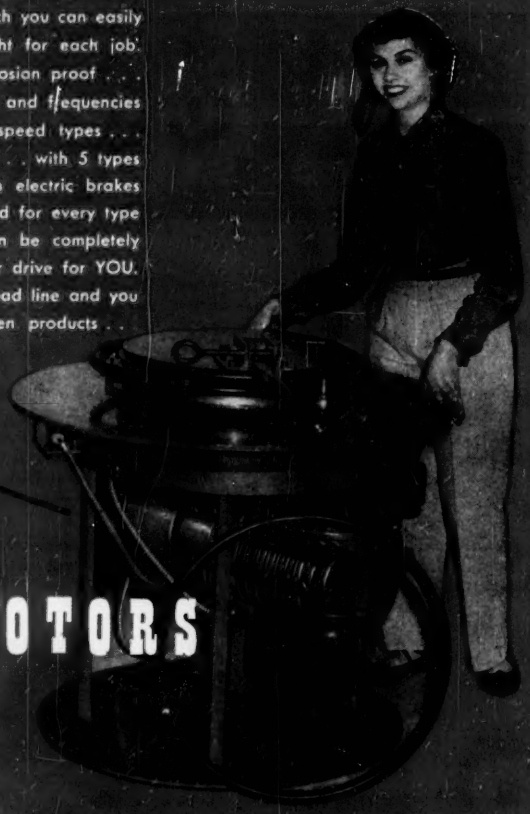

MASTER GEARMOTORS

Biggest Value You Can Buy in a Folding Carton...

The SELLING IDEA!

Here are a few of the famous names for which we have produced cartons with a SELLING IDEA . . .

General Motors Corporation
General Foods Corporation
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Sunshine Biscuits, Inc.
The Coca-Cola Co.
The Electric Auto-Lite Co.
Peter Cailler Kohler
James B. Beam Distilling Co.
Goodyear Tire & Rubber Co.

● Yes, the biggest value you can buy in a folding carton is there before the carton is made. It's the basic thought . . . the *Selling Idea* . . . the one raw material that has value beyond price. For the *Idea* is the thing that makes the whole carton come alive . . . stand out on the shelf or counter . . . reach for the customer's eye . . . fix the name of your product in her memory and buying habit.

Selling Ideas don't come easily. They're the product of know-how, experience, talent, hard work. For more than half a century, United Board & Carton has demonstrated its ability to create sound Selling Ideas for many nationally-known companies. Ideas that fit the product, the market and the job to be done! It will cost you nothing to find out. Let's talk over *your* problem.

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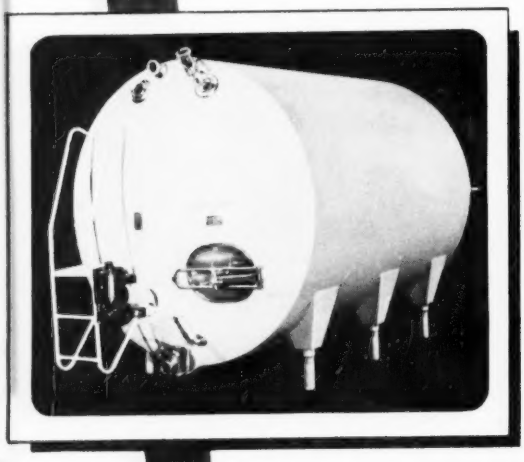
Check these "Little Things" when You Look at a Storage Tank ...They make a Big Difference



Available in a full range of sizes from 1000 to 7000 gallons. Your choice of "Refrigerated Wall" Storage Coolers or "Plain Insulated" Storage Tank with submerged coil, wrapped coil or spray-type cooling. We make vertical tanks, too.

does it have . . .

Deep Dish Spun Heads . . . with large knuckle radius for extra strength, easier cleaning for greater sanitation. 12-gauge lining heads?

Individual Tank Fittings Conveniently Grouped?

No-Foam Inlet . . . two-piece for easy cleaning, removable from outside of tank?

Air Vent and Telegage Fitting . . . with removable screen. Will it accommodate air chamber for any hydrostatic-type gauge?

Inspection Window . . . removed from light source. Allows unimpaired view of tank contents . . . easily removed for thorough cleaning?

Inspection Light . . . mounted over separate window and away from the tank to eliminate heat transfer to the product?

Stainless Steel Collars . . . on fitting where they enter the front head. All-welded construction for a well rounded, easily cleaned surface . . . better appearance?

Ladder and Safety-Tread Platform . . . designed for safety and convenience? Can operator work with both hands free?

Large 3-Blade Agitator . . . of stainless steel driven at low speed; direct gear head motor drive for gentle, thorough mixing? Easily removed without entering tank?

Inside Closing Manhole Door . . . of heavy stainless steel, closing inside tank but swinging outside for easy cleaning? Does design eliminate flat surfaces where product or condensate can collect? Is sampling valve standard equipment?

In the Cherry-Burrell Model D Storage Tank you'll find every one of these "little things" in design, engineering and craftsmanship that add up to big savings in man-hours . . . extra convenience and durability. These are the features that in the long run give you the lowest cost tank available.

Ask your Cherry-Burrell representative to show you the "little things" of great importance found in the Type D tanks. You'll find they can make a big difference in your storage problems.

Send coupon for complete information on the Type D Tank.

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DECEMBER, 1950

Food Industries

If Big Business Were Destroyed—Then What?

When is a big business too big? That is a fair question which needs to be answered for the benefit of business, labor and the public. It needs to be answered because big business is a vital force in this country which runs the real risk of being undermined. It needs to be answered because small business, consumers, workers, farmers and lawmakers want to retain the advantages of our great industrial enterprises without suffering from their alleged evils.

The charges leveled at big business range all the way from the cry that it makes excessive profits to the charge that it ultimately leads to socialism or fascism. Yet a detailed study of the evidence presented to back up the charges leads to no clear-cut conclusions.

On the other hand, the benefits of big business are obvious to all familiar with industrial achievements in this country. Big corporations can take a fair share of the credit for research, development and modernization. These have given us new and better products at reasonable cost and in tremendous quantities. They have made high wages possible, enabling the masses to own good homes, automobiles, refrigerators, radios, television sets and other "luxury" items.

Big corporations, too, have supplied the know-how and the production capacity to produce the weapons necessary to win wars—and only big companies could have done that job in time.

All these benefits of bigness are summed up in a neatly turned question by John A. Hartford, chairman of the board of the Great Atlantic and Pacific Tea Co., a firm which the Department of Justice has been trying with all its power and propaganda to tear to pieces.

Asks Mr. Hartford, "Who is going to build a better world than the one big business is helping to build now?"

Until the enemies of big business can answer that question convincingly, they should not try to tear down bulwarks of our progress and national safety.

But Mr. Hartford does not stop by posing the $64 question. In an article in *The American Magazine* he offers some "yardsticks" which are a better measurement than mere size for determining whether a company is serving in the public interest. Here they are:

1. Is the company striving to serve the best interests of its customers by improving its products, giving better services and lowering prices?

2. Does it have good relations with its employees, pay them well, offer security and opportunity for advancement and give them good working conditions?

3. Does it deal fairly with its suppliers and help them to grow too?

4. Does it have strong competitors and is it possible for others to enter the same field and operate successfully if they are qualified?

If "yes" is the answer to all these questions, then the company can't be big enough to be harmful.

But one more question is needed to measure the contribution of bigness to the country which supports it:

Is the company contributing to progress in its industry and in allied industries?

We think that bigness carries with it the responsibility to do just that. Certainly the company management would be most wise to make such a contribution, if for no other reason than to build good industry and public relations.

We believe that most big companies do contribute to progress in their fields. But there is room for them to do still more. Active participation in industrial and technical associations is the least they can do. Support of the nation's Point 4 program to foster technical progress in backward countries is a more recent important requirement.

We know of no big American company which is bad for the country or the world. But there are some which could be better.

—F. K. LAWLER, Editor

KEY to new packaging technic is this specially designed, patented machine that pulls 29 in. of vacuum from laminated Pliofilm-cellophane bags. Unit then heat seals open-end bags while they remain in machine's vacuum chamber.

Vacuum Bag It—For *Better* Quality

By excluding the air from sliced bacon packages, Armour greatly extends shelf-life. Curbed: Rancidity, discoloration, drying out, and mold

E. S. STATELER
Associate Editor, "Food Industries"

Bacon that goes fresh from the meat packer's slicing machine directly to the frying pan might well be desired by the consuming public, although not attained in commercial practice. The best alternative is packaged bacon with maximum freshness possible through application of the latest technological developments.

An example of such an alternative is Armour and Company's operation, where sliced bacon is vacuum packaged in heat-sealed flexible bags.

Among the advantages of this packaging are—

- **Production of a semi-rigid, easily handled, and attractive package.**
- **Exclusion of air to avoid drying out of the slices and deterioration of their appearance.**
- **Removal of oxygen to inhibit development of rancidity and of mold and bacterial growth.**
- **Prevention of discoloration while on display in retail self-service stores.**

Further about the package: A portion of each bag is opaque in order to carry the label and trademark identifications, while the remainder is transparent to show contents and add to sales appeal. Made of laminated Pliofilm and cellophane, these bags retain a minimum of 24 in. of vacuum and they have a maximum oxygen permeability of 0.0015 with an optimum of 0.0004, measured in terms of cc. of oxygen per sq. in. per 24 hr. at 40 deg. F. and 85 percent relative humidity.

Tests showed that they provide sliced bacon with a shelf-life of more than 21 days before loss of freshness becomes apparent. By careful supervision, leakers can be kept to a maximum of 3 percent. A price spot or panel on the label portion of the package makes it unnecessary to paste on a price sticker and it helps avoid the breaking of the vacuum by a pin-type price card. Results of a nine-month market test in one chain of stores showed no returns or complaints on 50,000 packages.

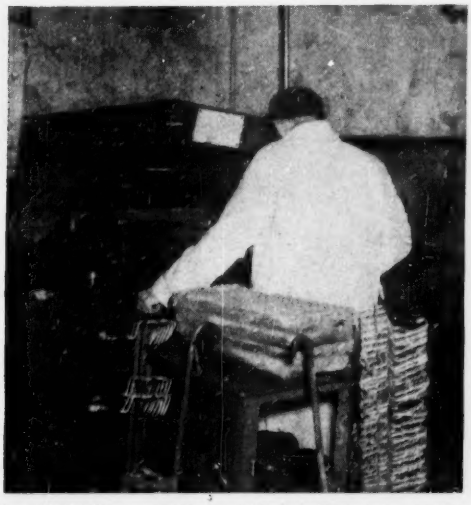
Packaging includes five steps:

1. Insertion of the filled open-end bags into a series of slot-like compartments of each of the five vacuum-sealing chambers radiating from a central shaft of the machine.

2. Rotation of filled chamber to the predetermined position under the vacuum head when the operator steps on an indexing pedal. Mechanical guides grip the top and bottom of each bag to hold them in place.

3. Automatic descent of the head

How Armour Slices and Packs Its New Fresh-Quality Bacon



1 **MACHINE** compresses chilled bellies into squares so that they can be shaped into uniform slabs.

2 **HIGH-SPEED** machine (top) cuts compressed slabs into shingled slices. Room is air-conditioned.

3 **SLICES** are weighed on over-and-under-weight type scales to assure proper amount in bags, then . . .

4 **SLOTTED PADDLE** is used to transfer slices into bags. Vacuum sealing completes the job.

upon the positioned chamber to draw a 29-in. vacuum, collapse the bags, and activate the movable sides of the compartments to exert pressure upon the bags preliminary to sealing.

4. Heat-sealing of the flaps of the bags under thermostatic control. All heating elements are guarded for safety of the operator. During this 10-sec. vacuum-sealing step, the succeeding compartment is being loaded.

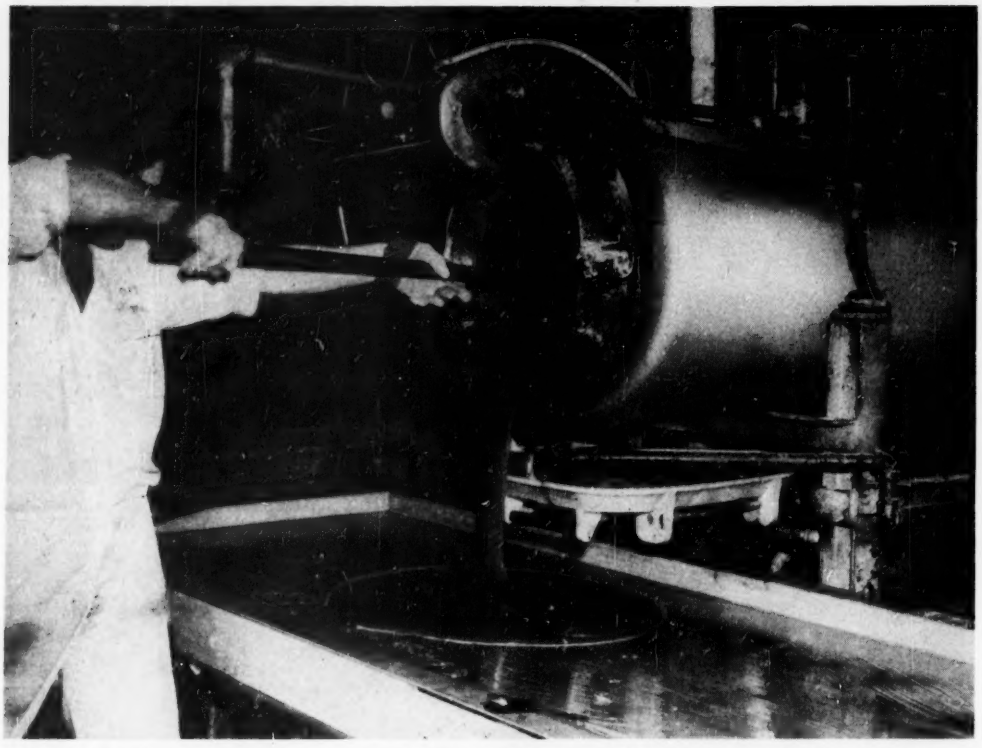
5. Automatic gravity discharge of the finished package from the machine into a bin or onto a packing belt when the succeeding compartment rotates into the vacuumizing position.

This method of packaging sliced bacon is the reward of four years of study and development in Armour and Company's packaging research laboratory and pilot plant under the supervision of Clarence Weisman, Director of Development, in cooperation with Standard Cap & Seal Co.'s engineers. Armour and Company departments that collaborated in the development of this new package were: Development & Standardization, Production Control, Sales Research, Advertising.

Production started on a small scale in the company's Chicago plant nearly two years ago to permit market testing in selected cities and progressive improvement in the commercial size packaging equipment and the packaging method covered by U. S. Patent No. 1,466,191. In the meantime, commercial production lines have been installed in seven company plants.

Moreover, this method of packaging has now been extended to include sliced luncheon meats.

UNIQUE TUBULAR COOKER: It's banished the slow pot



EFFICIENT pipe-type vacuum cooker was specially designed, handles a 300-lb batch of hard candy every 22 min.

Bottlenecks Licked by Mechanizing

Charms did it by redesigning special units that increased the efficiency of its hard candy cooking, forming, cooling, mixing, and packaging operations

JOHN V. ZIEMBA
Assistant Editor, "Food Industries"

You can, true enough, *start* a nickel hard candy business by getting an acceptable formula and the plant and equipment to make it.

But to *carry on profitably* in the business, year in and year out, requires much more than that—constant mastery of the problems of production and costs.

Take the case of Charms, Inc., of Bloomfield, N. J. This candy-making firm has built a top-notch business by mounting a continual attack on tomorrow's bottlenecks today. And that way, "bound-to-happen" jam-ups haven't happened.

Outstanding in keeping the company in the forefront have been the many progressive steps achieved through mechanization. In all six of its major operations, the company, through the recent years, has painstakingly sought —and attained—greater efficiency. The notable changes have improved (1) Materials handling, (2) cooking, (3) forming, (4) cooling, (5) mixing assortments, and (6) packaging.

All of the refinements were preceded by careful analyses. In certain cases, these pointed to rather large outlays of capital—for instance, development of a special new wrapping machine cost about $275,000. But the worthy production economies and quality improvements that were assured gave ready justification to the expenditures.

Each of the six big changes will now be detailed, in production-line order:

Sugar Goes Liquid

First change on the processing line was in handling sugar. Bulk of the sugar is in the form of a liquid—corn

Panoramic View of Line

Action sequence of Charms' modern automatic units is diagrammed in this month's foldout picture-flowsheet featuring big-volume hard-candy production. Turn to pages 102-105.

syrup and liquid sugar. Reason for using these syrups is that they contribute to in-plant savings—omission of several unit operations and smoother production.

Outdoor storage tanks—one of 30,000-gal. for corn syrup and six of 12,000-gal. for liquid sugar—were erected. Thus, greater flexibility was achieved and, of course, plant-floor space was saved.

Corn syrup (43-deg. Baume) is delivered to the plant in 8,000-gal. tank cars, equipped with steam coils that heat the syrup as it is pumped into the big insulated, outdoor storage tank. Here, the syrup is again heated by hot water that circulates through coils around the tank. As needed, the syrup is pumped into an 11,000-gal. rectangular tank inside the plant. Next, the syrup goes either directly to the cooking station or to the blending room and then to the cookers.

Liquid sugar (67-deg. Brix) is hauled to the plant in 3,000-gal. tank trucks with self-contained, gasoline-powered pumps that deliver it into the six 12,000-gal. outdoor storage tanks. Next, it is pumped into two 3,000-gal., porcelain-lined storage tanks inside the plant. Then, the liquid sugar is either pumped to the cookers or to the blending room and then to the cooking station. In the blending room there are four 1,750-gal. tanks in which corn, sugar, and invert syrups are mixed according to specifications.

Bulk sugar is trucked to the plant in 100-lb. bags. Dry sugar is added to 67-deg. Brix sucrose syrup in the precook kettles to speed up the cooking operation. Boiling sucrose syrup alone to the desired solids content naturally would take longer.

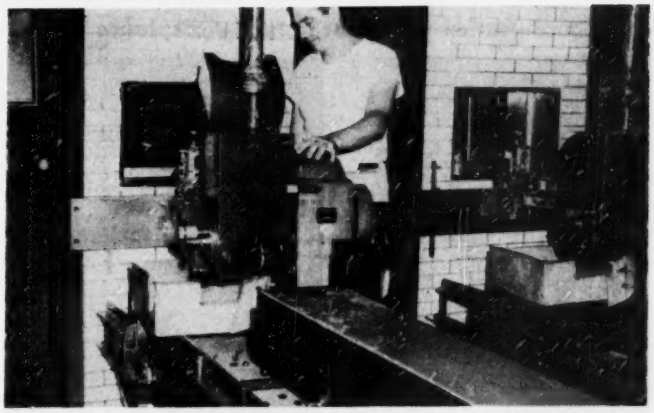
Special Cooking Unit

Next change made on the line was to redesign the cookers for greater efficiency. Cooking 100-lb. batches of hard candy in conventional open pot kettles takes about 35 min. Charms felt that a more efficient kettle could be built. And so the company's engineers went ahead and designed a new unit—a 20-ft. long, insulated, flat-bottomed pipe-shaped kettle that cooks a 300-lb. batch in only 22 min. Reason why a larger batch of candy can now be cooked in less time is that this cooker has a greater heat-transfer surface and a bigger area of product surface from which moisture is vaporized.

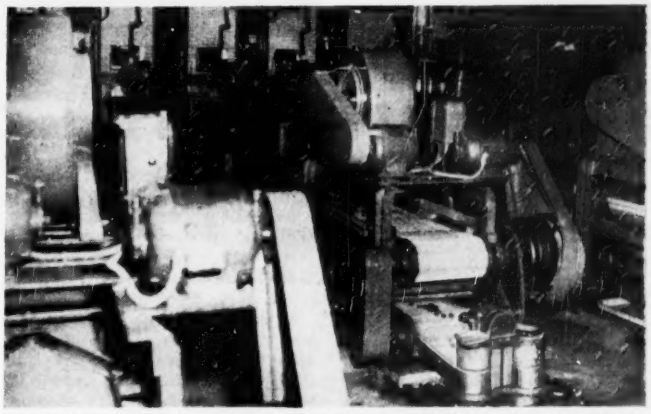
In the cooking department, corn, liquid, or blended syrups are metered into precook kettles. The type of syrup used depends upon the kind of hard candy that is being made. Here, too, bulk sugar is added—100-lb. bags at a time.

(*Turn to page* 180)

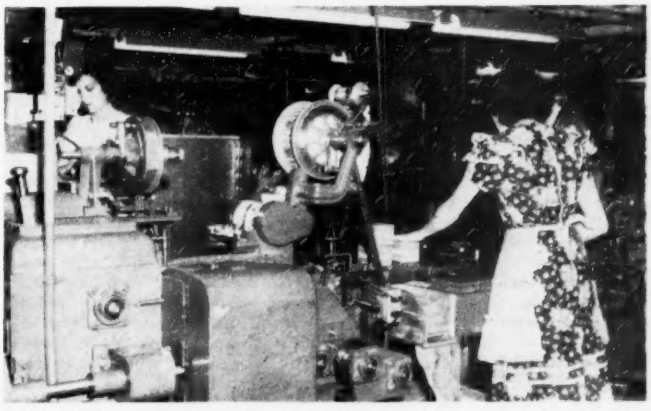
Fast-Action Units That Turn Out More Candy



HIGH-SPEED forming machine (center) takes strip of candy coming from batch spinner and sizing rolls and then punches out 1,000 tablets per minute.



CANDY TABLETS are continuously cooled as they travel on this 350-ft. double-tier, wire-mesh belt conveyor. Room is cork-insulated, air-conditioned.



THIS RAPID wrapping machine does triple job: Wraps each tablet in cellophane and stacks 10-piece units that are then foil-wrapped, heat-sealed.

It's "Concentration Plus" In the Food-Acceptance Tests

PLURALITY of test booths permits multiple evaluation of the samples.

PANEL of women goes into action as QM studies food likes and dislikes. Feminine factor is specially pertinent in comparable checks on civilian products.

Problem of Preference Gets QM Focus

Also of prime importance is panel-establishment of quality . . . Industry's aims are closely parallel in pursuing both these key questions

DAVID R. PERYAM
QM Food & Container Institute for the Armed Forces, Chicago

Several areas of investigation are involved in the determination of the acceptance of foods and description of foods in terms of their sensory properties. And in each of these areas there lie a number of specific problems.

Some of these problems relate to the mechanics of measurement, such as test design, questionnaire construction, and selection of observers. Others are of a research nature, such as investigation of the monotony factor and the gaining of knowledge of the elements in the acceptance equation.

Of the many specific questions encountered in food acceptance, two are of particular importance both to the armed forces and to industry. They pertain to—

- **Preference evaluation of food, and**
- **Establishment of food quality by panel procedures.**

Preference—or "degree of liking"—for a food, is one of the most important factors in acceptance. In fact, preference and acceptance are considered almost identical in the thinking of many people and in their experimental approaches to the acceptance problem.

An influential factor is that preference is relatively easy to investigate. Also, there is justification for this attitude in that this factor appears to be the most constant single determinent of acceptance. It can be measured in the laboratory with fair assurance that the same direction and relative magnitude of effect will maintain in field tests or other practical conditions of use. Hence its measurement becomes a first order of business in any acceptance program.

Termed "Hedonic Value"

A discussion of meanings is in order here. Although "preference", in a strict sense, refers merely to choice, without regard to the reasons for that choice, by tacit agreement it has come to mean pleasantness or degree of liking. This apparently causes little or no confusion. Psychology has a specific name for this factor—"hedonic value." The name is a definite help in theoretical understanding, but it must be used with caution in the food research field, since it usually will require definition.

Several methods, all of them contributed by experimental psychology over 50 years ago, are available for measuring hedonic values. Assessment of comparative values, either between paired samples or by ranking in order, gives the "power-house" technics for this purpose, because the results, within their limitations, are very specific. One limitation is that they provide only relative values. Another limitation, from a practical point of view, is the considerable amount of labor required per unit of information obtained. The rating-scale method offers better possibilities and is used far more often.

Rating scales for evaluating food are in common use, but they present a confusing picture to the researcher. They vary in physical design, which may be important, and in the task which they set for the test subject, which is of vast importance. Frequently, a rating scale succeeds in doing no more than comparing similar items which are presented together, hence it has no advantage over the direct-comparison methods, except that of saving labor. When the purpose of the testing is only selection of one item from among a number of similar alternatives, this is no reason for criticism.

Food research for the armed forces, however, faces a broader problem which may frequently confront industry also. Feeding in the armed services may utilize any common food. It may use common foods in somewhat unusual forms, or there may be developed new and unusual items. At the same time, military requirements, particularly for operational rations, are such that the number and variety of items to be included in a ration are severely limited. There is competition not only between variants of a single type (the typical industrial problem) but also between foods that are quite different from each other.

Since one basis of competition is acceptability, there is need of a technic which will measure the hedonic values of all manner of products on a common basis. A method is required that will, for example, do more than tell how one brand of pork and beans stands up to another—that is, also give some idea of the value of pork and beans in relation to canned biscuits, chocolate candy, or food bar "No. X-21."

The basis for the required method is found in the fact that people are seldom indifferent to the food they eat, but nearly always experience pleasure or displeasure in some degree. This response remains basically the same, varying only in direction and intensity, even though the foods which bring it about may be quite different from time to time. Therefore, this response can serve as the common basis for comparison. Moreover, the level of this feeling should have predictive value for actual acceptance.

9-Point Scale

A rating scale and a test procedure have been derived from this theoretical basis. The scale has nine points, and these points are given word descriptions ranging from "dislike extremely" to "like extremely". Further, the instructions are designed to direct the test subject's attention to his feeling about the food, rather than to the food itself. For this reason, "like" and "dislike" terms are used instead of the more technically correct "pleasant" and "unpleasant", and also because they are more likely to mean the same to all persons.

The length of the scale was determined experimentally. Replicate testing of items of varying hedonic value showed that responses were repeated more consistently when the scale had 9, rather than 5, 7, or 11 points. Also, the test as a whole discriminated between the items as well with the 9-point scale as with any of the others.

This scale is being used constantly for consumer preference tests in the laboratory and has also been employed in field testing. In general, the results have been good. The method has a satisfactory reliability when repeated on similar groups, although its validity as a measure of hedonic value, as such, can hardly be determined until there is available some accurate, unquestioned method of determining likes and dislikes.

Although laboratory results with this scale give considerable insight into what will happen in the field, there is plenty of evidence that it cannot in itself predict final acceptance. But this in no sense invalidates the method, since hedonic value is but one factor in acceptance.

The possibility of developing improved ways of interpreting results gives hope that the method may become even more valuable. Simplicity demands that, if possible, results be reduced to a single index. To do so at present, the scale points are numbered from 1 to 9, and the arithmetic mean of the points checked is used as the desired index.

However, with any group of consumers, the assigned ratings tend to spread over a wide range of the scale. This may be considered as a true reflection of the well-known fact that actual likes and dislikes for a particular food also vary widely. When large groups of observers are used, the frequency distributions of assigned values tend to fall into certain patterns, and it seems likely that these patterns may have a significance for prediction of hedonic value and acceptance far beyond what is possible with the mean rating.

Establishing Food "Quality"

The second methodological problem is that of establishing quality of a food by trained panel judgment of sensory properties. Such tests are probably used more often than any other type in sensory food evaluation throughout the country. "Quality" in most such testing is defined poorly, if at all. The ability to apprehend quality is supposed to come only through experience, in amount and nature also undefined.

The Institute's acceptance program is committed to defining excellence in terms of the consumer's response. Hence, attaining a judgment of "good quality" is not an end in itself. Interest lies in using the method to predict the "like-dislike" response of consumers. In this way "quality" serves as an intermediate criterion.

The method has value for two reasons: First, it usually gives better discrimination between items than does a consumer preference test. And, second, it is easier to conduct, since it requires fewer people and doesn't bring up as serious a sampling problem.

Judgment of quality is also approached by the rating-scale method, using a scale in which the points are described as levels of quality. There may be some question as to whether a valid distinction can be made between this and the hedonic value method. It is quite possible that a naive observer would respond the same way on both. The difference lies in the kind of response which is asked for.

The hedonic value method is designed to call forth a naive, immediate response, while the other is gaged to encourage the exercise of judgment. The distinction is made valid by using in the latter test only observers who have been selected and trained for ability to judge. Quality is defined for them as that combination of sensory properties which is most likely to please the consumer, and they are

Sensory Properties Are Dominant

More accurate means must be found, states Author Peryam, for evaluating the reception, in actual use, of the many different foods. And in any progressive approach to the gaging of food acceptance there must be major consideration of those sensory properties that play such a dominant role in human likes and dislikes.

The many problems—both specific and general—are clearly indicated in this tenth and final article of our food-for-the-fighters series. Particularly noted is the fact that some of the hurdles are now being taken in stride.

Many others, however, still loom high, their details not yet satisfactorily defined. It is here that the present discussion offers greatest value by pointing the immediate path ahead. Well rounded out, too, are the basic factors initially introduced by the author in his preceding range-finding article, "How QM Maps the Food Acceptance Salient" (p. 83, Nov. FI).

given as much information as is available about the trend of consumer preference in any particular case.

This approach is based upon the premise that observers can be trained to disregard their own individual preferences and to evaluate foods according to their knowledge of the behavior of others. Here, validity is an immediate and vital concern, since if this test cannot predict consumer preference with at least passable accuracy, its efficiency avails nothing. However, this can easily be checked in the laboratory.

Although at the present time the quality judgment method utilizes primarily a 9-point balanced scale similar to that employed for hedonic value, there is evidence that having a fixed scale type and scale length may be of no advantage, and that both reliability and discrimination might be increased by adjusting the scale to suit the product and the training of the observers. Nor is there anything to be gained here in having all ratings expressed in a single index, since it is hardly significant to compare the excellence of one type of product with that of another. The test is expected only to compare items of the same type by reference to the standard of quality for that type.

Trained Panels

A further problem has been suggested in discussion of both the judged quality method and the analytical use of sensory testing for research purposes. This is the matter of training. Any laboratory which does sensory testing must either consider this factor, or else rather pointedly ignore it. Great individual differences exist in sensitivity and skill. It is also evident that peoples' reactions tend to change when they are continually subjected to test situations. Any sensory testing program should have a theoretical approach and (if possible) a practical policy which take such conditions into account.

Although use of the small trained panel is almost traditional, often it is not clear just what the panel brings to bear, beyond a suggestion of an aura of some sort of specialization. It may be represented as having special technical knowledge or long experience. Too frequently, its only qualification is availability. The result has been that to dub a group a "trained panel" has had little meaning in itself.

In the Institute's acceptance program, "trained panel" is defined operationally by the process by which panels are established. Panels are set up for specific products or for particular types of investigation. A group of at least three times as many persons as are desired for the panel is tested for ability to detect typical differences that may be found in the product under investigation, and those persons showing obviously poor discrimination are discarded.

Those remaining are intensively tested for ability to detect differences and are further evaluated as to stablity of their judgments of quality upon replicate testing of a number of items. The resulting data permit ranking of all potential panel members according to skill and as many as are needed can be taken from the top ranks.

These panels might be considered more "selected" than "trained." However, the selection process itself provides a good deal of training. And after selection, the panel members are continuously provided with any information and instruction that will be helpful in orienting them.

Consumer-Preference Observers

Laboratory consumer preference testing, too, is never free from observer problems, and they are more serious than problems of trained panels, since arbitrary solutions are less acceptable here. Sometimes there is a question of determining what type or class of people to use. But too often no selection is possible, and there is only concern over the validity of the test results. Seldom is a laboratory fortunate enough to have available a good sampling of the actual consumers of the product. The usual approach must be that of avoiding as many suspected biases as possible.

The armed forces acceptance program is no exception. Service men are the potential consumers, but are not available for laboratory preference testing. Those persons available to the Food Acceptance Laboratory of the Institute are 200 employees of the Institute, including technologists and administrative and office personnel, and about 500 persons from other activities of the Chicago Quartermaster Depot, including administrative and office personnel, as well as skilled and unskilled laborers. Candidates for the trained panels are drawn from this pool, and criteria have been set up for selecting persons from the same source for preference tests.

By policy, a consumer is any one who: (1) Has no technical knowledge of the product under investigation, (2) knows nothing about the immediate problem, and (3) has not been selected on a panel for the product concerned. Selection is random within these restrictions. This pool of observers probably represents a typical cross section of civilian food preferences, and the assumption must be made that the soldiers' preferences will not be found to differ markedly.

Where testing is done continually at one location, it is often suspected that a person's preferences will tend to change as he is subjected to the test situation again and again. Some laboratories even avoid preference testing, in the belief that this tendency completely nullifies results. Logically, it is quite possible that a person might cease responding with naive expression of likes and dislikes and, instead, express opinions derived from his testing experience. Yet, little is known about this change—even its existence is not proven.

If the effect is real, the point at which the change begins, its direction and amount, the course of its progress, and how to delay or prevent it are matters of speculation. This represents a serious problem for the Institute, since the possibility of the existence of such an unknown in every result makes interpretation difficult.

"JUST HOW SENSITIVE is he to odor?" That's one of the essential questions in rating a test subject for QM's special appetite studies. This Elsberg technic gives the answer.

Comparison With Industrial Problems

An approach to a solution is possible with the large pool of observers who are available. Most of the 200 personnel of the Food & Container Institute have participated in the testing program for several years and have had full opportunity to become "pseudo-trained," while most of the 500 remaining have had little or no experience. The first group will constitute a control against which to compare results from the larger group of naive observers, as its members acquire experience. This may give some insight into what, if anything, is happening.

It will have been noted that the

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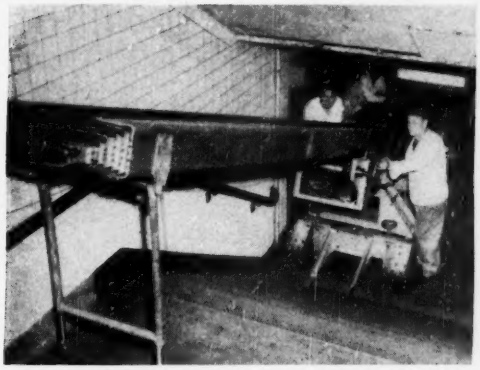
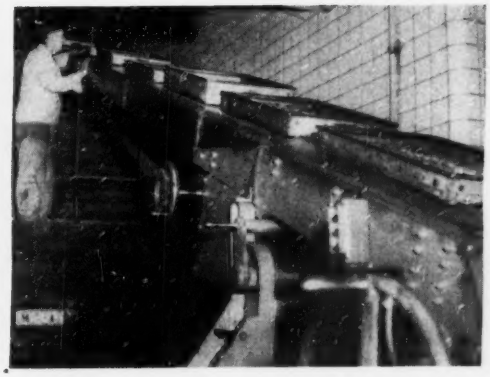
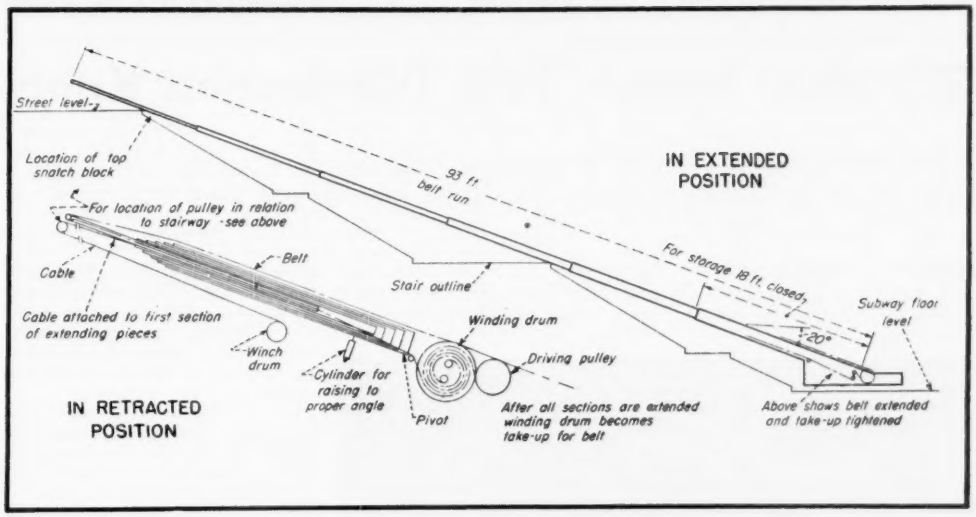
Rolled to Stairs, It's Projected to Street . . .



. . . For Rapid Handling of Goods



Working Details: The Carrier Set Up for Action and Telescoped for Storage


Street level
Location of top snatch block
For location of pulley in relation to stairway - see above
93 ft. belt run
IN EXTENDED POSITION
For storage 18 ft. closed
Subway floor level
20°
Cable
Belt
Stair outline
Cable attached to first section of extending pieces
Winch drum
Winding drum
Driving pulley
Cylinder for raising to proper angle
IN RETRACTED POSITION
Pivot
After all sections are extended winding drum becomes take-up for belt
Above shows belt extended and take-up tightened

'Scope Conveyor Solves Tough Problem

Baker's bogey—a 93-ft. stairwell—is overcome by special telescopic unit that delivers goods direct from trucks on street to subway retail shop

EXECUTIVES of Cushman's Sons, Inc., Long Island City, N. Y., were really stymied.

In opening a new retail bakery shop on the lower level of New York City's 34th Street IND subway station, they had run smack into a materials-handling problem that was enough to confuse a Harry Houdini. The question was: How could the big loads of fresh baked goods be delivered easily, quickly, and safely from street-level down a stairwell to the lower-level shop.

That stairwell comprised four flights 93 ft. long in all.

The only solution, first off, seemed to be to detail a crew to manually carry the many trays of baked goods down the stairs and later tote he empties back up—a slow, laborious, and costly operation. Obviously, this wouldn't do. But what would?

The company kept on grappling with the puzzle, proposing and rejecting. And then, finally, engineers of the Latendorf Conveying Corp., Bayonne, N. J., were called in and asked to tackle the riddle.

In short order, these materials-handling experts came up with the answer that put the baking company at ease—a portable, telescopic, inclined con-

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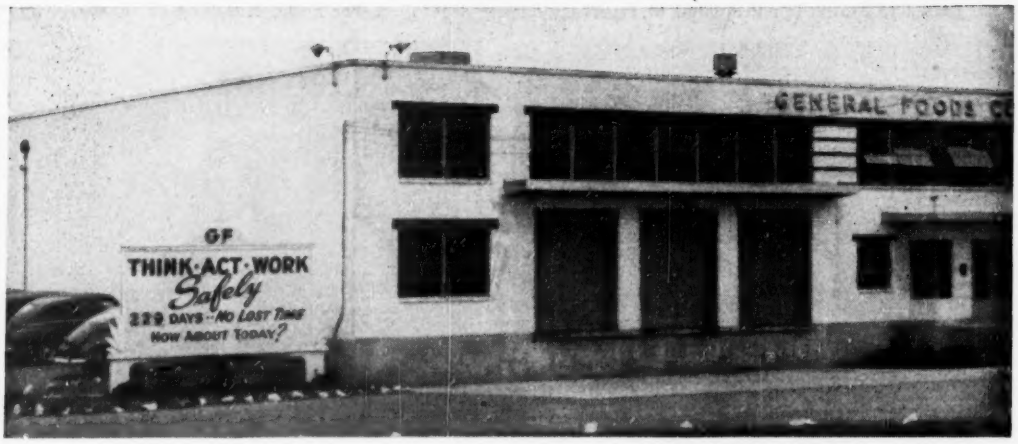


Its functions fulfill a new concept

GF's New System Cuts Distribution Knots

Centers provide gathering points for products of General Foods' multiple plants, permitting the shipment of mixed carloads direct to customers

ARTHUR C. SCHIER

Vice-President in Charge of Traffic, General Foods Corp., New York City

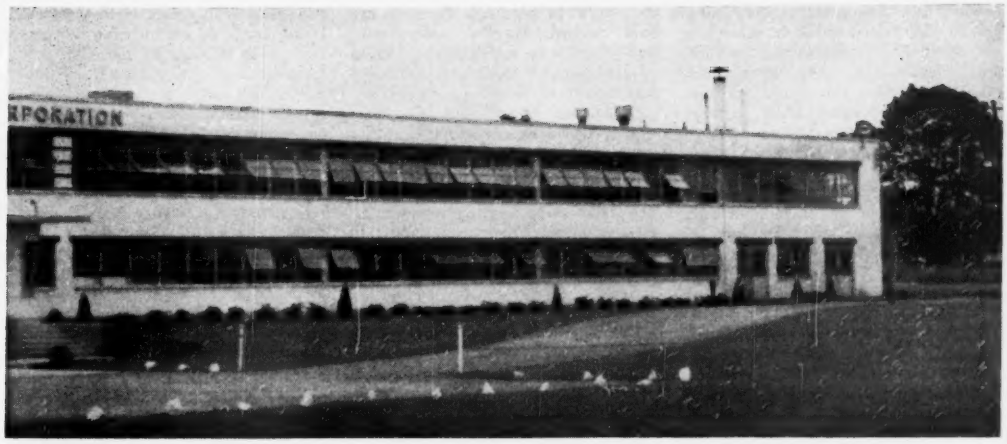
Storage-in-transit, combined with product mixing privileges, has reached full utilization at General Foods Corp. after a long and thorough study of the company's intricate distribution needs which require that a variety of products and package types be continually supplied from widely separated plants to wholesale grocers throughout the country.

Out of the Cars . . .

WITH 18 freight cars accommodated inside, both unloading and reloading are completed during workday—for a fast-clicking 24-hr. "turnaround."

General Foods' management concluded that plans had to be developed to simplify the physical distribution of its multiple-product output. Direct carload shipments from the production plants were too great a strain on the financial and storage resources of most of the company's wholesale customers. Pool car shipments of the products of each plant multiplied the problems of the larger wholesalers. The result, too often, was either an overstocked customer or one with no stock at all. The company wanted to sell, and deliver, mixed carloads containing whatever products and quantities were ordered by the grocer.

Surveys and studies of the company's sales districts—jobbers' buying methods and needs, plant locations, and the like—made evident the need for a better distribution plan. From this intensive study grew the outline of a new pattern of distribution out of which has developed the strategically located distribution centers now operating at Toledo, Ohio, Camp Hill, Pa., and Jersey City, N. J. Another is under construction at Kankakee, Ill. It is these cen-



of service to company customers

ters that form the bases for the storage-in transit and mixed car operations.

In form and construction these distribution centers are no more than large modern warehouses. Their function, however, is another matter.

Under the former system a customer had three choices in ordering products: He could take carload lots of the products of any one plant, he could enter into a pool arrangement with other grocers, or he could purchase in l.c.l. lots. The many shortcomings of each of these methods are obvious to manufacturers and distributors alike. Thus, the first function of the center is to make it easier for the wholesaler to do business with General Foods.

Basically, the system permits shipments of carload lots from each of the company's plants into the distribution center and the sale and delivery of mixed carloads containing all products; provides mixed carload shipments direct to the private sidings of the larger wholesale grocers; and it establishes pool car break-bulk points for truck distribution to customers ordering smaller quantities. It is far simpler, however, to describe the pattern than it was to work it out—or than it is to execute it.

How It Was Worked Out

Early studies had established the fact that an effective distribution center would have to be located so that every shipment outbound would be part of every through route from each factory to final destination. Surveys showed the direction and volume of the products moving into the various areas from GF manufacturing plants. Correlating these movements with plant locations pinpointed northern Ohio as one vortex of this movement. Adequate rail facilities determined that Toledo be chosen as the testing ground for the new plan. A former warehouse was modernized and the system entered the full scale experiment stage on Jan. 1, 1948.

One year spent in ironing out the kinks at Toledo satisfied the company that it was very much on the right track. So early in 1949 the work of selecting sites in the other already determined areas was begun.

How completely the operation had been worked out on paper is indicated by the similarity in the designs of the newly constructed buildings at Camp Hill, Pa., and Jersey City and the converted warehouse at Toledo. There are minor variations, of course, but a description of one will suffice as a general outline for all. And this similarity holds true in the plans for Kankakee.

Handling and Storage

The Camp Hill building has an area of 108,000 sq. ft., all on one floor. Office space on a mezzanine extending

. . . And Into the Stacks

BUILT-UP by fork trucks, the palletized stacks of cases rise as high as 18½ ft. Wide cross aisles enable quick handling of the orders.

across the front adds another 4,000 sq. ft. Depressed tracks on either side of the building, but under the roof, each accomodate nine 40-ft. cars. Deducting space for tracks, utilities, cross aisles, loading aisles, salvage room and heating plant leaves 50,000 sq. ft. as the net storage area. Cases may be stacked to a height of 18½ ft., which is 1½ ft. below the automatic sprinkler system that extends throughout the warehouse and office.

A total of 7,600 wooden pallets are in constant use. They are moved by 11 new gasoline-fueled fork trucks (each equipped with a special 172-in. lift for high stacking), plus 12 electric power jacks and 5 hand pallet trucks. Standard-sized pallets, 46x54 in., were found most suited to the company's varied products and case sizes.

Inbound cars are switched into the building at night for unloading the following day. As fast as they are unloaded the cars are appropriated for outbound loads. Thus, a loaded car switched into the building during the night is unloaded and reloaded for outbound movement by 4:30 the following afternoon. This is excellent utilization of railroad equipment.

Like the other centers, the Camp Hill distribution area extends longitudinally, from the Canadian border to Florida. Its east and west limits, of course, mesh with Jersey City and Toledo.

Camp Hill handled 6,000 cars during its first year. The most distant mixed car customer should receive his order at his private siding within four days after shipment. Frequently this is bettered. Mixed carload shipments constitute about 70 percent of the volume.

What about the other 30 percent—the mixed pool cars that will go to break-bulk point for distribution to smaller wholesalers? In the Camp Hill area alone, 62 break-bulk points have been established. Mixed pool cars are shipped to these points regularly. To the larger cities a car is shipped about once a week. And at least one car a month is shipped to the smaller points.

Stock Control

To keep these shipments rolling with a minimum of capital investment requires judgment and careful timing. On the one hand, the center must always have an adequate stock of every item. On the other, inventories must be held to a point where turnover is rapid. At present, turnover is at an average rate of two to two-and-a-half times per month. The ultimate aim is a turnover rate of once a week. Such an achievement calls for mighty close scheduling.

In ordering replacements from the company's 14 plants, a formula has been devised whereby procurement time (days) is multiplied by cases shipped per day to find the minimum safe inventory point for requisitioning purposes. For example: The time required for delivery of an order from Battle Creek to Camp Hill is known, also the number of cases of cereals being shipped out of the center daily. The daily stock position report indicates when the time has arrived to order Post cereal products. If timed perfectly, the new shipments should arrive on the day the last of the old stock leaves the center.

On some products the rate of withdrawal is fairly constant. If coffee, for instance, is withdrawn at the rate of two carloads a day, it is necessary to see that replacements arrive at the same rate. With such products the turnover can be very rapid.

Storage-in-Transit

Operating under the traffic principle of storage-in-transit means that incoming shipments must also be requisitioned over specific routes in order to maintain balances over those routes for the continued outbound shipments to destination.

On movements into the center, the regular carload freight rates are assessed. But when mixed carloads are shipped out, freight is charged on the actual weight of each commodity, at a rate representing the balance of the carload rate from plant to destination. Added is a fee for the transit arrangement.

In choosing billing to back up an outbound shipment, the transit clerk must select only from the inbound route that can be made continuous with the outbound shipping route. Thus the route outbound from the center becomes part of a through route from plant to destination.

Stock Handling

Loading and unloading crews are arranged into groups, each group consisting of a checker, a fork lift driver, a stock picker and two carloaders. As an inbound car is unloaded, the carloaders stack the cases on pallets in accordance with specified pallet patterns. An electric power jack pulls the full pallets out of the car and positions them on the floor just outside the car. Fork lift trucks are then used to remove them to stock piles. The checker notes on his copy of the receiving report the exact quantities removed from the car. The fork truck driver makes a separate count and indicates on his copy the number of cases placed on the stock piles.

These separate counts must agree not only with each other but with the plant's loading tally—which has not been seen by any member of the crew. If all counts do not tally, an independent check is made by the warehouse foreman. If the plant's tally still proves inaccurate the plant is asked for an additional invoice for overage or a credit memorandum for a shortage.

Cases damaged in transit are removed immediately to the salvage room for recoopering or rejection to the carrier. Inner containers in good condition are repacked into new shipping cases and returned to stock piles on the floor. Stock not suitable for shipment is rejected and claim papers assembled for filing with the carrier. Out of, say, five cases damaged in transit, the salvage room, in repacking, may find the equivalent to three good cases, leaving only two cases for rejection.

Each day's work is planned in advance by the superintendent, who must know by late afternoon which cars are to be brought in for unloading during the night and which orders are to be loaded in these cars. Here is what happens in the filling of a district office pool car order:

A transmittal of order is prepared by the district office in triplicate, accompanied by weight and "cube" sheets showing the shipping weights and number of cubic feet for every product, arranged according to freight classification groups.

Comptometer operators calculate the shipping weight for every product, since this information is necessary for preparation of individual bills of lading. When all arithmetical computations have been made, the order is passed to the allocation clerk for processing. The clerk, who maintains a running inventory of the stock on hand, deducts the amount of each product shown on the transmittal. This is to be sure that no order reaches the warehouse for shipment unless there is stock on hand to fill every item shown.

The order is next passed to a typist for completion of a preprinted loading tally. The typist also prepares a return postcard, addressed to the distribution center, requesting the opinion of the consignee on the condition of the load when he receives it. All papers now go to the order register clerk, who separates them into three groups:

The loading tally—one copy of transmittal, cube sheet and postcard—is forwarded to the warehouse shipping office as instructions to load the car. Another copy of transmittal, with the weight sheet attached, is sent to the traffic section for application of transit billing and preparation of the shipping papers. The third transmittal copy is retained by the order register clerk until the car has been loaded

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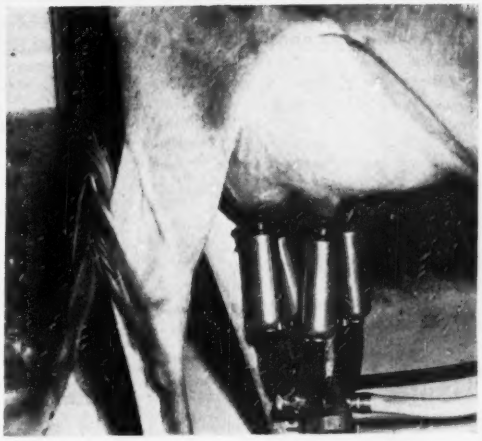
Look for trouble here ▼

Once they're let by here ▼



Don't Let Quats Ruin That Flavor

Their presence in cheese milk is now blamed for causing flat taste by curbing growth of aroma bacteria. But you can steer clear of it by simple rinsing procedure

ERIK LUNDSTEDT,
Production Manager, Sante Foods, Inc., Goshen, N.Y.

Unless vigilance is exercised, quaternary ammonium compounds used in sanitizing dairy farm and plant equipment will be carried over into the milk supply. And, if this milk is used for cheese making, growth of aroma-producing bacteria will be inhibited and the desired flavor cannot develop.

But careful rinsing of equipment with clean water before operations will eliminate this hazard.

Cheesemakers often must grapple with adverse conditions in their milk supply which do not affect the market milk industry. For example, the presence of 300 units of penicillin in a quart of milk may be inconsequential to some branches of the dairy industry, but it is troublesome to the cheese industry, which depends on high quality starters for its final products.

In the same way, a few parts per million of certain quaternary ammonium compounds may not seem serious to the dairy farmer delivering milk to a bottling plant. But it can be a serious hindrance in the cheese-making plant.

For the past two years some difficulties have been experienced in the manufacturing of dairy products relying on high quality starters for the aroma and taste of the finished product. Rate of acid development on short sets of cottage cheese milk has been about normal—skim milk containing 5 percent starter, set at 90 deg F., developed 0.15 percent lactic acid (0.20 to 0.35 percent) in 3 hr. and coagulated the milk in 4 to 5 hr. The peculiarity with this type of milk was its inability to support the growth of the aroma bacteria.

Factory starters were green, denoting lack of citrate fermentation, and the cream cheese mixes were flat in taste and aroma. Furthermore, it was observed that the cottage cheese curd was "dead", lying on the bottom of the vat regardless of the acid in the whey. And no aroma was noticeable in the finished cheese.

It was quite evident that something was present in this milk which interfered with the activity of the aroma bacteria but not with the lactic acid bacteria. This interfering substance was either bacteriostatic or bactericidal in nature, with a selective affinity for the Leuconostoc group.

Aroma Bacteria Need Phosphate

I have discovered that the supposed symbiosis between the lactic acid bacteria and the aroma bacteria is indirect. Aroma bacteria in starters require a lactic acid-soluble inorganic phosphate, associated with the casein in milk, before they can ferment the citric acid and produce aroma. This phosphate compound is released from the casein at a pH of 5 or lower, or a whey acidity of 0.45 percent and higher.

Seeking to demonstrate this point, I developed a new starter medium containing all of the inorganic milk phosphates in a citrate soluble form. Specifically, I added 5 parts of sodium citrate (27 percent water of crystallization) to 100 parts of starter whey. A sparkling, clear citrated whey was produced which proved a perfect medium for the growth and aroma production of starters and pure cultures of the Leuconostoc group.

Eight Year Old Starters Lost

These starters can be kept for at least 14 days at room temperatures in this medium, and aroma bacteria for at least 4 months without deterioration or loss of vitality. (Citrated rennet whey is worthless as a medium for starters, since the rennet curd retains this unknown phosphate compound necessary to the citrate fermentation of the aroma bacteria.)

Citrated whey starters were carried

Starters Lack Flavor When Quaternaries Are Present

TABLE I—AROMA-PRODUCING BACTERIA Do Not Multiply In Milk Starters Containing Quaternaries and Antibiotics

Quaternaries In Milk Ppm.	Score	Milk Starters: Total Acid Percent	Milk Starters: Voges Proskaver Test	Citrated Whey Starters: Developed Acid Percent	Citrated Whey Starters: CO_2	Citrated Whey Starters: Voges Proskaver Test
		Para Diisobutyl Phenoxy Ethoxy				
0	Excellent	0.88	Pink	0.32	++++	Red
1	Good	0.89	Sl. pink	0.99	0	Negative
2	Poor	0.89	Negative	1.01	0	Negative
3	Poor	0.84	Negative	1.05	0	Negative
		Cresoxy Dimethyl Benzyl Ammonium Chloride				
0	Excellent	0.88	Pink	0.35	++++	Red
1	Sl. off	0.86	Sl. pink	0.57	++	Pink
2	Poor	0.77	Negative	1.01	0	Negative
3	Poor	0.79	Negative	1.10	0	Negative
		Alkyl Dimethyl Benzyl Ammonium Chloride				
0	Excellent	0.89	Pink	0.32	++++	Red
1	Sl. off	0.78	Negative	0.81	+	Sl. pink
2	Poor	0.75	Negative	1.00	0	Negative
3	Poor	0.72	Negative	1.01	0	Negative
Units Per 10 ml. of Milk			**Penicillin**			
0	Excellent	0.88	Pink	0.30	++++	Red
1	Good	0.73	Sl. pink	0.25	++++	Red
3	Not set	0.43	———	——	———	———
			Streptomycin			
0	Excellent	0.86	Pink	0.33	++++	Red
1	Good	0.77	Pink	0.25	++++	Red
3	Clean	0.62	Sl. pink	0.26	++++	Red
6	Not set	0.38	———	0.32	++++	Red

TABLE II—GROWTH OF AROMA BACTERIA In Citrated Whey Starters Is Inhibited by Alkyl Dimethyl Benzyl Ammonium Chloride

Quaternary In Milk Ppm.	Cultures Used	After 24 Hr.: Acid Developed Percent	After 24 Hr.: CO_2	After 24 Hr.: VP	After 8 Days: Acid Developed Percent	After 8 Days: CO_2	After 8 Days: VP
0	H	0.73	++	Pink	0.32	++++	Red
0	F. L.	0.67	++	Pink	0.30	++++	Red
0	N. S.	0.61	++	Pink	0.29	++++	Red
0	F. D.	0.63	++	Pink	0.33	++++	Red
1	F. D.	0.60	+	Sl. pink	0.33	++	Sl. pink
2	F. D.	0.63	0	Negative	0.31	+	Sl. pink
3	F. D.	0.48	0	Negative	0.88	0	Negative

TABLE III—LARGE QUANTITIES OF STARTER (6¼ Percent) Do Not Overcome Inhibiting Effect of Most Quaternaries When Added at Rate of 2.5 Ppm.

Quaternary	Cottage Cheese Milk: Percent Acid After 3½ Hr.	Cottage Cheese Milk: VP After 16 Hr.	Citrated Cottage Cheese Whey: After 48 Hr.: Acid	After 48 Hr.: CO_2	After 48 Hr.: VP	After 8 Days: Acid	After 8 Days: CO_2	After 8 Days: VP
None	0.53	Pink	0.26	+++	Red	0.40	++++	Red
H. 2389	0.48	Neg.	0.81	0	Neg.	1.02	0	Neg.
H. 1622	0.47	Neg.	0.75	0	Neg.	0.98	0	Neg.
H. 10X	0.45	Neg.	0.79	0	Neg.	0.95	0	Neg.
Roccal	0.49	Neg.+	0.74	0	Sl. pink	0.53	++	Sl. red
Emulsept	0.52	Pink	0.19	+++	Red	0.37	+++	Red
Kleen-Easy	0.50	Neg.	0.80	0	Neg.	0.92	0	Neg.

TABLE IV—SMALL AMOUNTS of Quaternaries (1 Ppm.) Are Effective Inhibitors for Short Periods Only

Age of Flav-O-Lac Starters	After 24 Hr.: Acid*	After 24 Hr.: CO_2	After 24 Hr.: VP	After 48 Hr.: Acid	After 48 Hr.: CO_2	After 48 Hr.: VP	After 72 Hr.: Acid	After 72 Hr.: CO_2	After 72 Hr.: VP	After 8 Days: Acid	After 8 Days: CO_2	After 8 Days: VP
						Quaternary-Free Citrated Starter Whey Medium						
5 mo.	0.01	+	Sl. pink	0.12	+++	Red	0.02	++++	Red	0.26	+	Red
4 mo.	0.11	+	Sl. pink	0.14	+++	Red	0.02	++++	Red	0.29	+	Red
3 mo.	0.33	++	Pink	0.16	+++	Red	0.03	++++	Red	0.33	+	Red
2 mo.	0.37	++	Pink	0.19	+++	Red	0.06	++++	Red	0.33	+	Red
1 mo.	0.16	+	Sl. pink	0.20	+++	Red	0.10	++++	Red	0.36	+	Red
1 wk.	0.46	++	Pink	0.17	+++	Red	0.06	++++	Red	0.30	+	Red
						Same Medium as Above Plus 1 Ppm. Hyamine 1622						
5 mo.	0	0	Neg.	0	0	Neg.	0.37	0	Neg.	1.04	0	Neg.
4 mo.	0	0	Neg.	0	0	Neg.	0.56	0	Neg.	1.00	0	Neg.
3 mo.	0	0	Neg.	0	0	Neg.	0.67	0	Neg.	1.01	0	Neg.
2 mo.	0	0	Neg.	0	0	Neg.	0.80	0	Neg.	0.99	0	Neg.
1 mo.	0	0	Neg.	0	0	Neg.	0.70	0	Neg.	0.98	0	Neg.
1 wk.	0	0	Neg.	0	0	Neg.	0.77	0	Neg.	1.05	0	Neg.

* Percent total CO_2-free acid minus control as percent lactic.

for a period of eight years with excellent results. However, during the last two years (1948 and 1949) these starters, or cottage cheese wheys, derived from certain tank loads of milk, showed no sign of citrate fermentation. The corresponding milk starters were green in flavor, indicating lack of growth of the essential aroma-producing bacteria.

After two years of work searching for the cause of these abnormalities, in which time several good cultures of aroma bacteria were lost, source of the trouble was discovered to be the presence of minute quantities of quaternary ammonium compounds in some milk supplies.

An examination of the creamery and dairy farm practices in Orange County, N. Y., disclosed that from 30 to 50 percent of the farmers use quaternaries in one form or another in milking machine sanitation. And a small percentage dip the teat cups in these solutions between each cow. Since the strength of solutions recommended for farm use is 130 to 250 ppm., the four teat cups, if dipped between each cow, can easily retain 1 oz. of this solution, which must necessarily find its way to the milk can.

If the farmers rely entirely on these recommendations, and the creamery sanitizes its processing equipment, cans, and tank trucks with quaternaries without an after-rinse with clean water, it is easy to see how a few parts per million of this substance may get into the milk supply.

To ascertain if such small amounts of the quaternary could prevent the growth of aroma bacteria in starters and related products, a series of tests were conducted. Table I gives results of tests with the three quaternaries most commonly used in this area. Samples of milk used for the experiment were prepared from the same lot of high-quality spray-dried skim milk powder in the proportion of 1 to 10 of water. Quaternaries and antibiotics were added and the milk was boiled for 1 hr., cooled to 72 deg. F., then inoculated with 0.1 percent dry starter powder.*

The inoculated milk was incubated for 18 hr. at 72±0.2 deg. F., cooled in ice water, and judged for flavor, acidity, and acetylmethylcarbinol or diacetyl by a modified Voges-Proskauer (VP) test** on the whey. Starters were then boiled for 1 hr. to precipitate the casein, albumin and globulin, then made sparkling clear by a suction filter using a No. 54 Whatman paper precoated with 2 cm. diatomaceous earth.

To 100 parts of this whey were added 5 parts of sodium citrate and 5½ mol of water. Then the pH was adjusted to 6.4-6.5 (giving a light olive green color) with sodium sesquicarbonate (any mild alkali is suitable), using 2 cc. of whey plus 2 cc. of a 0.05 percent brom thymol blue indicator in 50 percent alcohol. The citrated whey was again boiled for about an hour, cooled to 72 deg. F., and the titratable acidity determined (control acid), observing sterile technics. It was then inoculated with 0.1 percent of the same powdered starters used in all the other experiments.

The citrated whey starters were examined daily for evidence of CO_2 formation by whirling the contents of the flask and then pouring a small amount into a 100-ml. dilution bottle, where it was shaken free of gas and then titrated for acid. The CO_2-free acid minus control acid is called developed acid in percentage of lactic. A VP test was conducted at the same time.

Doesn't Take Much

It can be seen from Table I that even minute quantities of quaternary ammonium compounds are injurious to the aroma bacteria in starters, or are highly efficient bacteriostatic compounds in milk.

Two parts per million will definitely prevent the aroma bacteria from growing, either in the milk or the citrated whey. However, the lactic acid bacteria are only slightly affected, and the developed acidity, after eight days in the citrated whey, is exactly the same for the three quaternaries.

Penicillin and streptomycin were included in these experiments to show that, although they affect the growth of the starter bacteria (as pointed out in the case of penicillin by Whitehead, of New Zealand, in 1948) they are not specific to the aroma bacteria. They are of consequence only if found in milk to the extent of 3 units per 10 ml. Such an amount could only be present in a tank load of milk if about 5 percent of the cows had been treated simultaneously with 100,000 units of penicillin and all of this reappeared in the milk. According to local veterinarians, this condition could not occur in this area.

From the standpoint of tolerance of the aroma bacteria to the quaternaries, it is possible that they, as well as the thermoduric bacteria, may eventually develop a resistance to these compounds. But so far it has not been possible to develop starters which can overcome 3 ppm. of the quaternary ammonium compounds investigated, without losing the aroma-producing bacteria.

Table II shows the effect of adding a quaternary to Guernsey milk in combination with four liquid commercial cultures. The whey was recovered as usual and prepared for a culture medium. It can be seen that as little as 1 ppm. quaternary can be detected in the whey cultures after 24 hr., but not after 8 days. The 2 ppm. sample showed no evidence of citrate fermentation after 24 hr., but it did recover after 8 days. The 3 ppm. sample did not support the growth of aroma bacteria, and so the whey became sour.

Lactic Bacteria Not Affected

Another experiment was conducted to see if a large amount of starter—6 percent—would overcome the effect of 2½ ppm. of various quaternaries. Results (Table III) shows that the quaternaries did not affect the acid development in starters from a practical standpoint, however all but one prevented aroma formation.

To find out if quaternaries prevent aroma bacteria from growing or multiplying, or if these substances interfere with the citrate fermentation, 5 ppm. alkyl dimenthyl benzyl ammonium chloride was added to a fully developed 24-hr-old citrated whey starter. No influence on the Co_2 production or citrate fermentation was observed for the next 8 days or more. This furnishes additional proof that the citrate fermentation in dairy starters is only incidental, whereas the lactose fermentation is the main function of these bacteria, since this carbon source furnishes them the energy for their multiplication.

Selective In Action

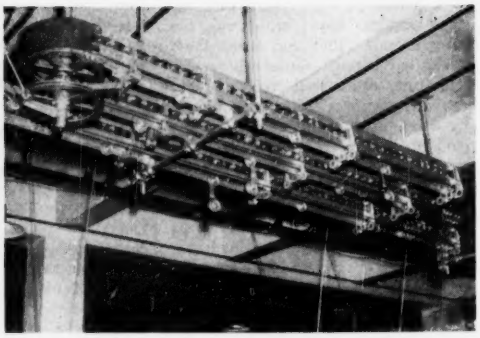
In other words, the quaternaries under investigation are selective in their bacteriostatic effect on the aroma bacteria in milk starters and prevent these bacteria from growing, whereas it takes at least 50 times as much of these compounds to prevent the lactic acid bacteria from growing.

In Table IV is seen the effect of 1 ppm. of a quaternary in a whey free of casein, albumin and globulin. This experiment demonstrates that this small amount added to whey also inhibits the growth of the lactic acid bacteria the first 2 days but, for some unknown reason, the bacteria recovers and produces, after 8 days, as much acid as starters containing no quaternaries. It is likely, therefore, that we are dealing with much smaller concentrations of quaternaries in the serum of the milk than the 1 or 2 ppm. used in these experiments.

* The powder (Flav-O-Lac Flakes —40— Buttermilk Culture) was weighed on sterile tin foil or parchment.

** Dissolve 0.1g. creatine hydrate in 100 cc. 10-percent "Roccal" solution. To 2 cc. whey add 5 cc. of this solution and 1 cc. 50-percent NaOH. Shake tube vigorously 20 times and again after 2 and 5 min. A slight pink to scarlet color will develop within 5 min. if acetylmethylcarbinol or diacetyl is present in the starter.

1 **CENTRALIZED CONTROL** panel for Schaefer can line is pointed out by George Waldron, shop manager.



2 **WHIP-AROUND** conveyor backlogs about 150 ft. of empty cans feeding filler.

Get Top Operation On Your Can Line

With These Advanced Methods and Inspection Devices

HOWARD JACOBY
Editorial Assistant, "Food Industries"

When brewers first decided to put beer into cans, they turned to the canning industry for much of the necessary know-how. But in the intervening years, the beer industry has come up with many of its own innovations that have improved operation and expanded capacity of the high-speed lines.

To spotlight the advanced engineering methods and inspection devices, we surveyed the can lines of two leading breweries in New York City, the F & M Schaefer Brewing Co. and Jacob Ruppert brewery.

First off, at the Schaefer plant all electrical controls for each can line are placed on one conveniently located panel (Photo 1). Normal starting and stopping is considerably simplified and the panel is especially helpful in emergencies. Each board has controls for: Main drive motors for pasteurizer, filler and closer; all pasteurizer pumps; check-weigher; packer; and conveyor drives.

Now let's start from the beginning of the can line. The longer the backlog of empty cans feeding into the filler, the better. By long is meant 100 to 150 ft. George Waldron, bottling plant manager at Schaefer says, "With a short backlog line, we had *numerous* gaps and many filler stops when torn cartons and other exigencies occurred at the unscrambler table. Production efficiency was impaired by about 5 percent. With longer lines, and proper speeds for catch-up, we eliminated 75 percent of these gaps and halts. And in addition to the production gain, operators at the unscrambler are able to space their efforts more evenly, instead of overworking every time they get behind. Thus, the longer backlog is really a type of shock absorber."

At the present speed of 340 cans a minute, the production increase means quite a lot in dollars and cents.

If you're pressed for space to put the long backlog in, as Schaefer was, a "whip-around" conveyor is the solution (Photo 2). That company also rinses the cans right next to the unscrambler, rather than just before the filler. It's more convenient to get at.

Occasionally, empty cans emerge from the filler. Here, a more reliable remedy than a watching worker, is an electric ejector (Photo 3). Two electrodes, actuated by a cam, dip down into each can. If it's empty no circuit is formed between the electrodes, and an air jet blows the can off the line. Different conductors suitable for various foods can be used as electrodes.

Cans Inverted at Pasteurizer

A clever bit of engineering is the idea of inverting sealed cans just before they enter the pasteurizer (Photo 4). The can bottoms have already been air-pressure tested by the manufacturer, so there is a perfect seal at that end. But when sealing the top end after filling, there may be small leaks. In the case of beer, the wanted carbon dioxide would be expelled. Such faulty cans could not be detected in the check-weighers (to be discussed later) because they have lost no weight. Hence a flat beer would be sold to consumers. And it doesn't take many flat drinks to lose sales.

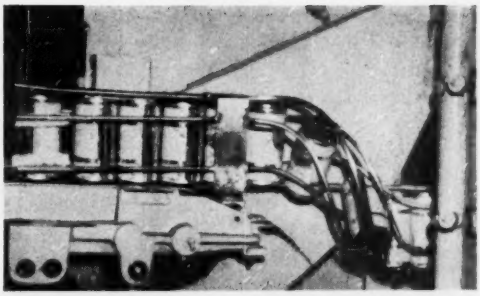
If however, the cans are inverted before entering the pasteurizer, instead of carbon dioxide being lost, beer will be forced out, since pressures reach 90 psi. in the pasteurizer. Then the can will have lost weight, and it will be thrown out by the check-weigher.

Use "Windshield" Wipers

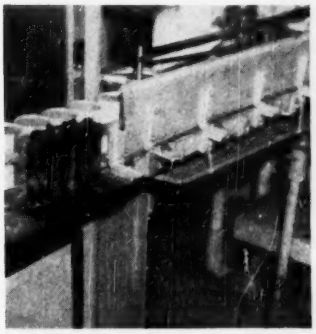
Problem of drying cans before packing has always been troublesome. Another method, besides the usual air jets, is a battery of vertical rubber blades, similar to those used for windshield wipers, that keep the wet cans rotating and skim the moisture off (Photo 5). Twenty or thirty blades held in an iron jig will do a good job. In addition, brushes like the painter uses, and held in the same manner as the rubber blades, help dry the cans. These two methods have this advantage over air jets—they are entirely self-operating. However, can tops still have to be air-jetted.

Since the internal pressure in cans will bulge defective ends, breweries use a very simple mechanical device to get the "bulges" off the line. Cans are turned on their sides and roll between two vertical, circular plates that rotate together (Photo 6). A bulged can will be caught between the plates and be automatically thrown

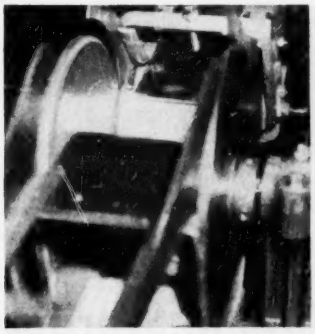
3 **EMPTY CAN EJECTOR.** Electrodes (arrow) "circuit" only in beer—empties are blown off line.



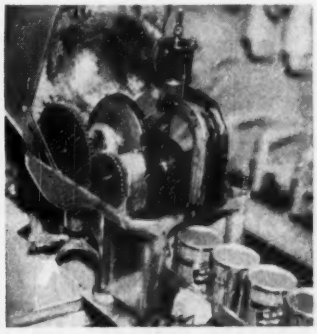
4 **INVERTING** cans at pasteurizer detects leakers that cause flat beer through loss of carbon dioxide.



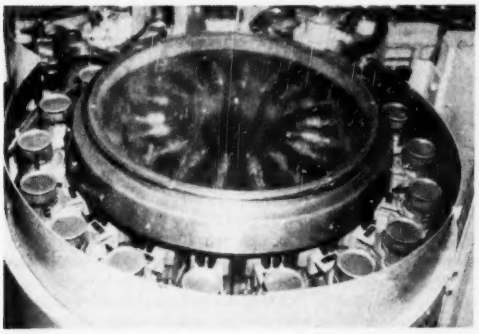
5 **BRUSHES** and rubber wipers (hidden) dry cans from pasteurizer.



6 **BULGE DETECTOR'S** rotating plates catch bad cans, shelve them.



7 **SELF-OPERATING MARKER.** Six-pronged wheel is turned by cans.



8 **CHECK-WEIGHER** operates on balance scale principle. Adjustable metal weights are seen through Plexiglas.

9 **AUTOMATIC PACKING** is achieved as carton's edge pushes against metal electrical contact (arrow).

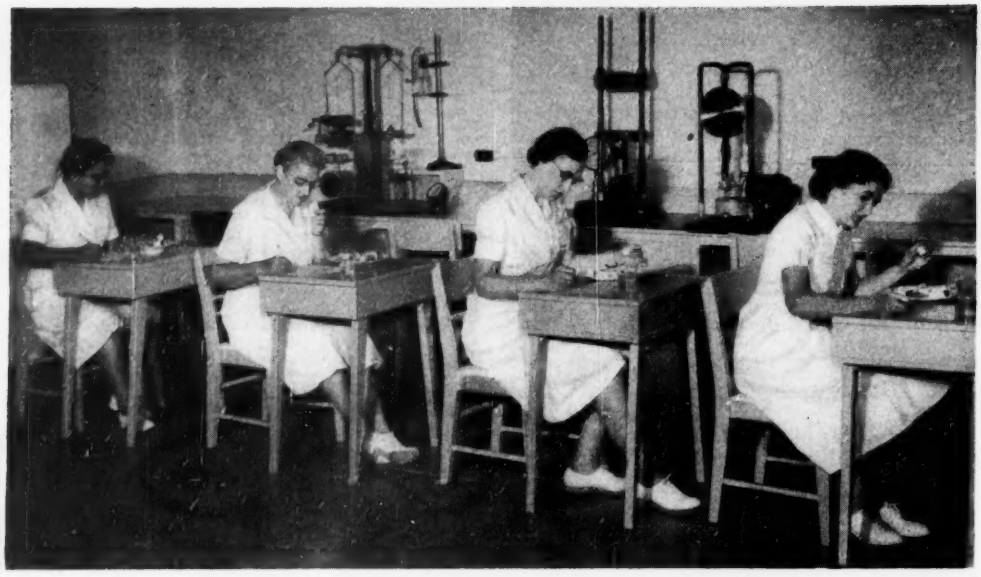
to a shelf above the line. Good cans pass on underneath.

Self-Operating Marker

Both Jacob Ruppert and Schaefer have adopted a self-operating marker (Photo 7). A can moving along the line catches a prong of a six-pronged horizontal wheel. Forward motion of the can turns the wheel which actuates the printing roll by means of a gear. As can be seen in the photo, the marking unit is smaller than conventional installations.

Uniform-weight cans are assured by the check-weighers (Photo 8). A worm screw continuously spaces cans onto 20 chair-like holders, each of which functions like a balance scale. A threaded metal weight on the other end of the holder is adjusted merely by screwing it one way or the other. As the unit rotates, cans that are short weight will not bring the holder down all the way, and will be ejected from the line. Usual adjustment on these machines allows a ¼-oz. leeway on the short side. Consumers get the benefit of cans that are overweight.

With the usual type of can packer, the operator, after placing an empty carton up against the rack, has to free one hand to flip a lever which activates the ram. Edward Kraeger, bottling superintendent at Ruppert, explained the idea of using a flexible piece of metal as the electrical contact (Photo 9). With it, all operator has to do is place carton against the can rack. Top edge pushes against the metal electrical contact and the rammer moves the cans right in.



PANEL rates appearance, eating quality, palatability of cakes, confirming that . . .

Time Limit is Vital in Storing Egg-Type Mix

Prepared cake mixes containing dried whole egg are shown to hold top quality only 7 weeks at room temperature, 20 weeks when refrigerated

LOUISE L. WHERRY and GWENDOLYN L. TINKLIN

Kansas Agricultural Experiment Station, Manhattan, Kan.

Recently completed research leads to the conclusion that prepared cake mixes containing dried whole egg should be held at refrigerator temperature if they are to be stored for more than a few weeks. And even at refrigerator temperature, storage in excess of 20 weeks is not recommended.

The study, conducted at the Kansas Agricultural Experiment Station, indicates that storage temperature is the main factor determining shelf life of the mixes. Presence or absence of shortening is termed of negligible consequence.

Problem that stimulated the testing was this: The prepared-mix field has grown by leaps and bounds during the last few years. Product quality is, most probably, the key to future growth. Increased storage time decreases this quality.

Previous research focuses the problem on the keeping quality of plain dried whole egg, the essential ingredient in most prepared mixes[1]. This component cannot be expected to keep well for long periods[2,3,4]. So just what is the maximum shelf life of plain cake mixes containing dried whole egg? And under what conditions can it be obtained?

To review the troubles connected with this most critical ingredient, reference is made to older studies of dried whole egg powder alone. When moisture content is above 5 percent, there is pronounced decrease in solubility with storage[5]. However, solubility is necessary to give desirable cell structure to cakes[6]. Mold and bacterial growth is particularly speeded in egg powder when relative humidity is high[5]. Deterioration is more rapid when storage temperature is high[6,7,8].

Present Study Procedure

Now to the present study: Certainly one cannot expect dried whole egg to have better keeping quality when incorporated into a mix, than when stored alone. Sifting of the ingredients exposes the egg to atmospheric moisture and oxygen.

Two groups of plain cake mixes, based on a golden layer cake formula, were prepared. The first contained only dry ingredients, while the second had both dry ingredients and shortening. All mixes were packaged in heat-sealed moisture-vapor-grease-proof bags.

One-half of the mixes in each group were stored at laboratory temperature (it ranged from 64 to 94 deg. F.). The others were kept at a refrigerator temperature of 40 deg. F.

Mixes were stored for 0, 3, 7, 20, 26 and 32 weeks. At the end of their respective storage periods, mixes were tested and cakes baked from them. Shortening, water and vanilla were added to mixes in the first group, while water and vanilla were added to the second-group mixes. Also baked at the end of each storage period were control cakes made from ingredients that had been stored separately under the best known conditions as determined by previous experiments. Batters were mixed in a Kitchen Aid unit for 4 min.

Four cakes were baked from each mix for each storage period. Since there were five types (control, 1st mix at lab, 1st mix at 40 F., 2nd mix at lab, 2nd mix at 40 F.), a total of 20 cakes were prepared for each period, or 120 in all.

A panel of six judges scored the cakes, considering general appearance, eating quality, and total palatability. In addition, the following determinations were made: Specific gravity and consistency of batter, temperatures during mixing, and also standing height, shortness and compressibility of baked cakes.

What They Found

After storage for 20 weeks, all mixes stored at laboratory temperature had a slightly undesirable color—tan or brownish gray. This coloring appeared both in batters and in the final cakes.

Batters from mixes of short-time storage were thin, with high specific gravity and low consistency readings. As storage time increased, batters became thick and viscous. It is thought that these changes might have been due to changes in the emulsifying power of the egg, caused by deterioration.

As this deterioration increased (with longer storage times), the egg apparently became less soluble, since small flecks could be seen in the batters. Cakes made from these batters were difficult to remove from the pan. And they had a somewhat mottled appearance in the top surface.

Cakes from mixes stored for 32 weeks did not rise evenly and had slight depressions in their centers.

In scoring for general appearance (Fig. 1), the judges were influenced by such undesirable characteristics as a blistered top or greasy surface, a pale or unevenly browned crust, and a tan color in the crumb.

Eating Quality

All cakes tended to have a coarse, bready texture. But this is to be expected in cakes prepared by a short mixing method.

After 26 weeks' storage, all mixes produced cakes with layers of collapsed cells. And after 32 weeks' storage of the mixes, resulting cakes had compact grain and crumbly texture. These felt "gummy" when eaten.

One of the outstanding changes noticed in the mixes was development of a sharp aroma as storage time increased. This odor continued in the batter and the baked cake.

Laboratory-temperature mixes imparted off-flavor to cakes at the 7-week mark. Those made from refrigerator-temperature mixes, and the control cakes, did not have an off-flavor until the 20-week point.

(*Turn to page* 184)

How Judges Rated the Cakes

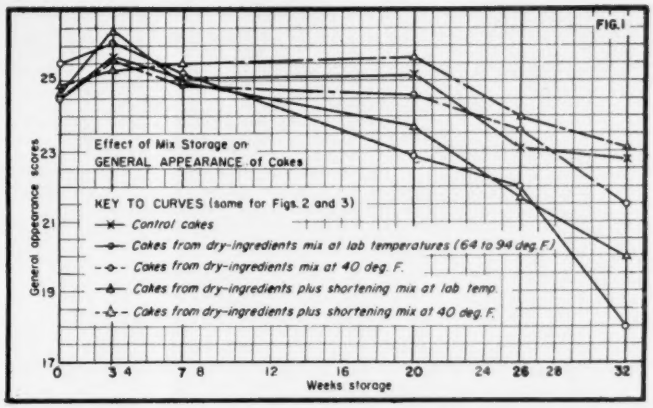
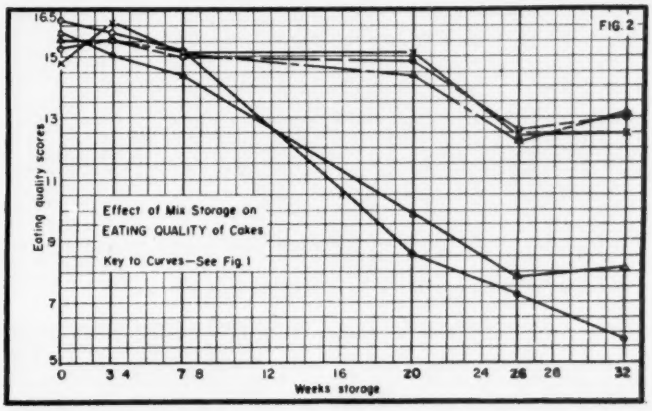
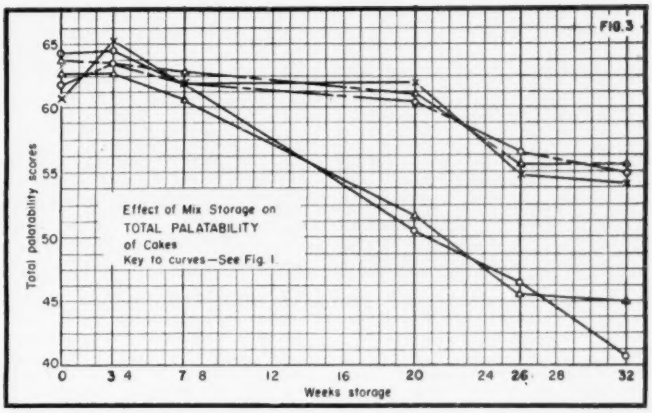


FIG. 1
Effect of Mix Storage on
GENERAL APPEARANCE of Cakes
KEY TO CURVES (same for Figs. 2 and 3)
Control cakes
Cakes from dry-ingredients mix at lab temperatures (64 to 94 deg. F.)
Cakes from dry-ingredients mix at 40 deg. F.
Cakes from dry-ingredients plus shortening mix at lab temp.
Cakes from dry-ingredients plus shortening mix at 40 deg. F.
General appearance scores
25
23
21
19
17
0 3 4 7 8 12 16 20 24 26 28 32
Weeks storage

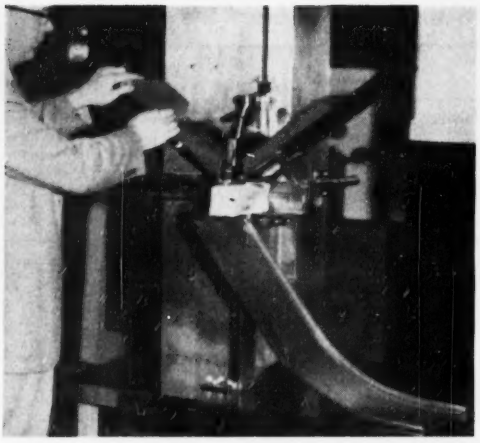
MIXES stored at room temperatures yielded poorer looking cakes than those kept at refrigerator levels.



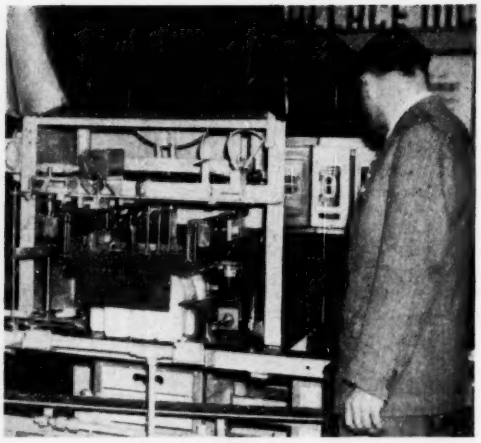
EATING QUALITY of cakes from room-temp. mixes dipped sharply after 7 weeks, while low-temp. mixes were good after 20.



TOTAL PALATABILITY of cakes from 40-deg.-F. mixes also stayed high until 20 weeks, while others had off-flavors after 7.



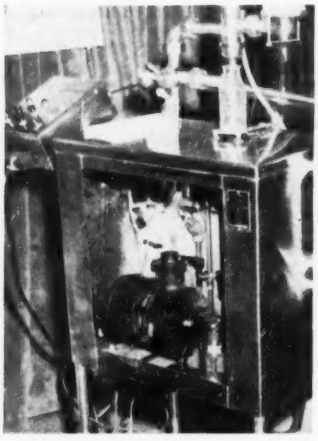
ICE CREAM SANDWICHES are made and packaged automatically at a rate of 125 doz. per hr. in machine developed by Anderson Bros. Manufacturing Co. Rockford, Ill. Attached to a continuous freezer, the machine extrudes a ribbon of ice cream, places wafers on each side of it, cuts off the ice cream by a quick sidewise motion, then inserts sandwich in air-opened bag. **(A)**



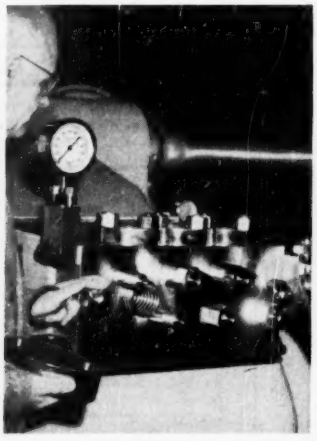
TO SAVE LABOR, Walker-Wallace, Ltd., Toronto, Can., has built a machine which automatically cases filled milk bottles at rate of 7,200 qt. per hr. Metal bars comprise the pick-up head, that has three sections, each of which lifts four bottles from a conveyor in sequence. Then head moves over case and lowers bottles into it. If no case is there, or if it is damaged, head does not operate. **(B)**

NEW AT THE DAIRY SHOW

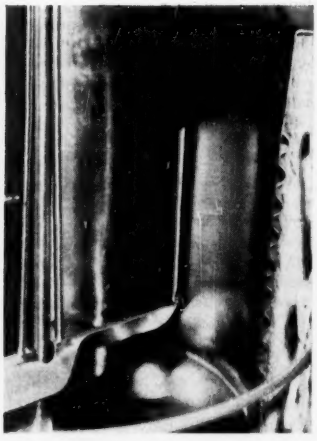
FI Camera Catches Advanced Equipment Exhibited at Atlantic City



ELECTRONIC milk sampler that draws 10 cc. from weigh tank and puts it into bottle shown by Dairy Supply Div., Langsenkamp-Wheeler Brass Works, Indianapolis, Ind. One operation, pushing a button, causes sample to be taken, then opens and closes weigh tank valves and makes ready for next sample. **(C)**

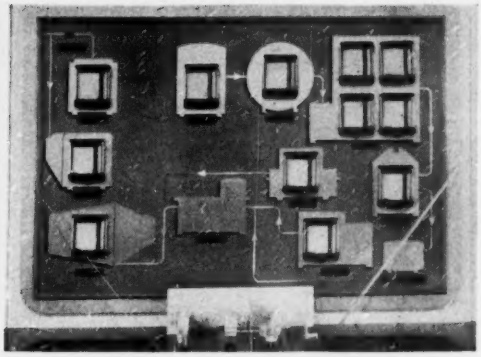


FOR EASY CLEANING, homogenizers without packing glands on plungers have been developed by Manton Gaulin Manufacturing Co., Inc., Everett, Mass. Seal is provided by leather ring held firmly in seat by heavy stainless steel spring which pushes against removable head on front of unit. Similar parts are interchangeable. **(D)**

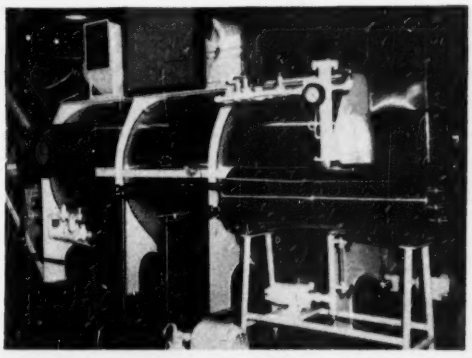


PROCESS VAT with removable sweep type agitator and special bottom drive was exhibited by The Pfaudler Co., Rochester, N. Y. Provision for either heating or cooling by circulation of medium through a spiral jacket, factory tested at 250 psi., is added feature. Steam, hot or cold water, Freon or ammonia may be used. **(E)**

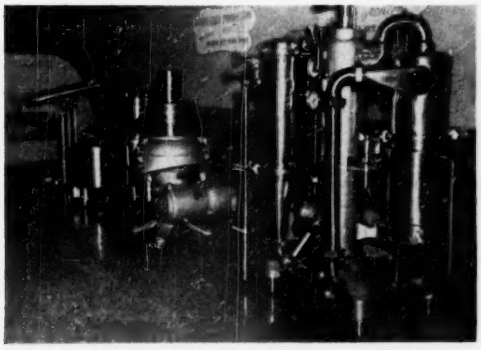
TO BREAK UP BLOCKS of frozen cream, butter, eggs or fruits, a simple 3-hp. easily cleaned riving machine has been developed by W. J. Fitzpatrick Co., Chicago. Two counter-rotating stainless steel cylinders with projecting teeth disintegrate the frozen product. Feed hopper will accommodate up to 30-lb. blocks. **(A)**

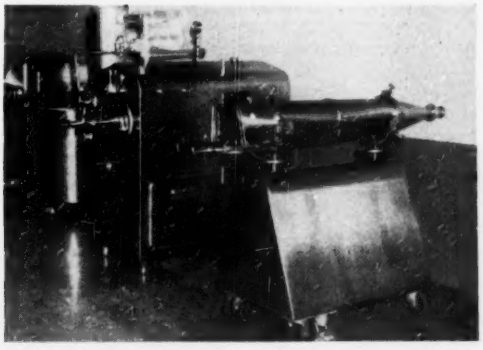


CONTROL PANEL with instruments centrally located to give process superintendent complete data on all important operations was displayed by Taylor Instrument Co., Rochester, N. Y. **(B)**



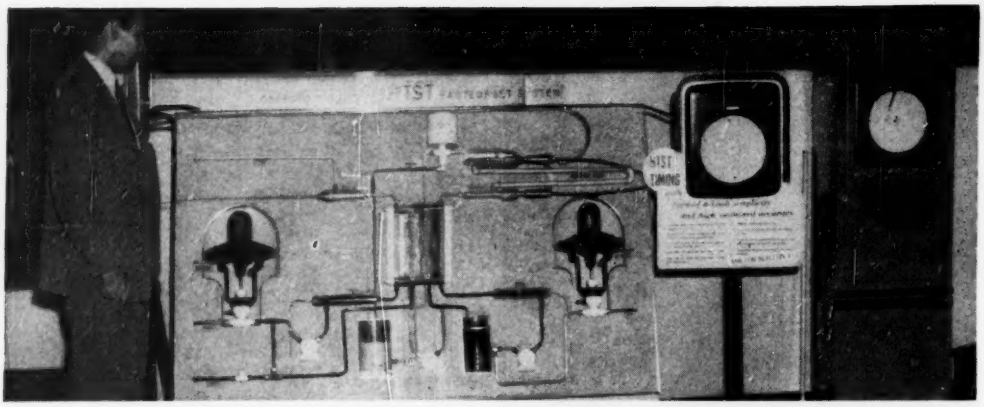
PILOT SPRAY DRYER with capacity of 150 lb. dry milk per hr. developed by Buflovak Midwest Co., Mora, Minn., features Microclone system of powder collection and continuous powder removal. Efficiency of this collector reduces drying-chamber area requirements. **(C)**



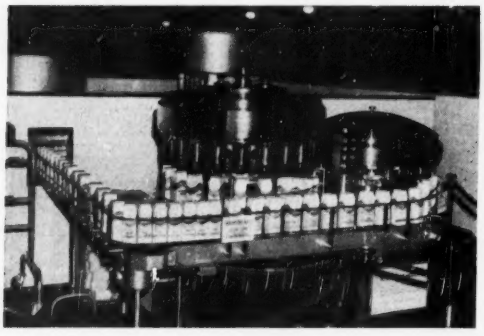


CONTINUOUS BUTTER EQUIPMENT was displayed for first time by Cherry-Burrell Corp., Chicago. Units (l. to r.): Filter, cream destabilizer, special separator, vacuum pasteurizer, composition standardization vat, chiller that converts cream to butter, and Texturator which works and extrudes finished product. **(D, E)**

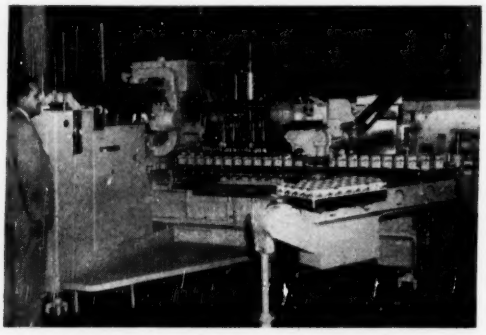
Turn Page for More New Dairy Units ⟶



HOLDING TIME in high-temperature short-time pasteurizers is checked by Foxboro Holding Time Timer. This is a temperature recorder with bulbs at inlet and outlet of holding tube. When switch is turned to inlet-bulb position, instrument automatically provides heat impulse. When switch is released, it turns to outlet bulb position, then the instrument charts arrival of heat impulse at that point and thereby measures holding time. New six-point recorder that picks different inking pen for each point is shown at extreme right. **(A)**

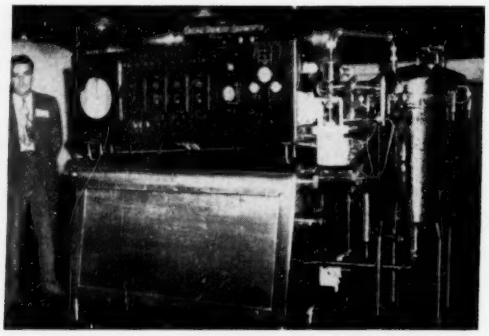


HIGH-SPEED paper bottle forming and filling machine developed by Pure-Pak Div., Ex-Cell-O Corp., Detroit, produces flat-top bottles for easy stacking in dealers' cases. Machine is comprised of three units that: (1) Form the cartons; (2) wax-coat, sterilize and cool them, and (3) fill and seal them, at estimated speed of 120 per min. **(B)**

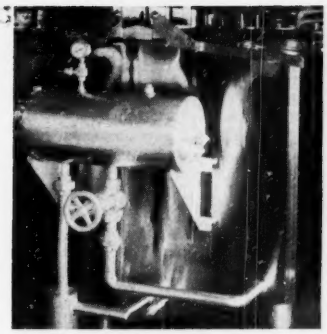


PLASTIC BOTTLE forming and filling machine for small dairies was displayed by Sealright Co., Inc., Fulton, N. Y. This unit forms bottles from flat blanks of plastic, sterilizes, fills and seals them at rate of 35 per min. It operates on same principal as the Sealking machine introduced last spring. **(C)**

HOODING MACHINE with new features was shown by Standard Cap & Seal Corp., New York. It has quick-change worm-type bottle spacer, opposite which are a series of spring-opposed plates which push out to avoid breakage of bottles in case they should jam between the worm and side of the conveyor. **(D)**



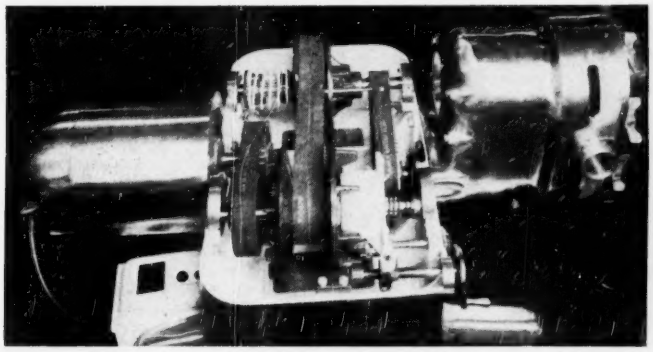
PACKAGED tubular HTST pasteurizer, complete with panel board, holding coil and new type regenerator, was displayed by Chicago Stainless Equipment Corp., Chicago. Unit employs high velocity annular flow and heat transfer surfaces on both sides of milk film. Only one sanitary gasket joint is involved in dismantling for cleaning. **(E)**



STORAGE TANKS with increased cooling surface resulting from new type wall construction, were exhibited by The Creamery Package Mfg. Co., Chicago. A jacket riveted to the inner cylinder provides space for intimate contact between refrigerant and product being cooled. **(A)**

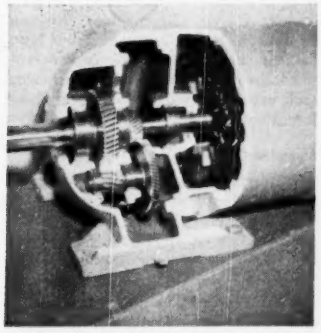
REFRIGERATION on the road, is provided by a high-speed compressor mounted on truck engine and driven by fan belt in system of Coldmobile Co., Detroit. When truck is garaged, refrigeration is provided by a plug-in compressor. Engine compressor has flexible self-sealing lines. **(B)**

SQUARE 3½-gal. Shainwood ice cream container exhibited by Container Corp. of America, Chicago, holds 40 percent more than the conventional 2½-gal. round can yet requires no additional storage, truck or cabinet space, and will not spin during dipping. **(C)**

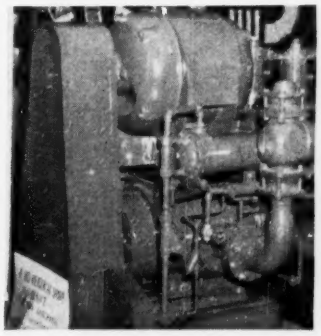


VARIABLE CAPACITY SANITARY PUMP equipped with new speed reducer that has an external seal to control selected maximum capacity, was introduced by Waukesha Foundry Co., Waukesha, Wis. Pumps are equipped with splash-proof motors, have speed ranges from 45 to 650 rpm., and are enclosed in corrosion-proof housings. **(D)**

ICE CREAM on sticks dry-coated with coconut, nut or "krunch" by Roto-Koter developed by Wood & Selick, N. Y. Coating is put on 24 bars (in stickholder) by rotating drum. **(E)**



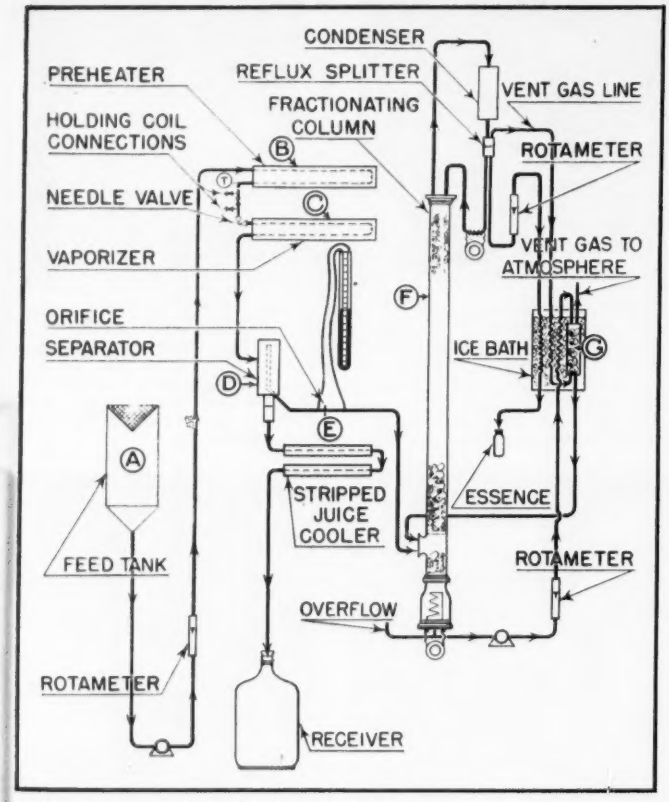
GEAR MOTOR with output speeds of 780 down to 75 rpm. was displayed by The Louis Allis Co., Milwaukee. The gear unit is made by Foote Bros. and is combined with a Louis Allis squirrel cage induction motor. Sizes: 1 to 75 hp. in all types of enclosures. **(F)**



COMPACT 50-ton ammonia rotary booster compressor with the motor mounted above it was exhibited by Freezing Equipment Sales, Inc., York, Pa. The compressor is a Fuller machine with eccentric rotor mounting. Requires very little space. **(G)**

NEW TEST KITS for determining hardness and chlorine content of water in 2½ to 5 min. have been introduced by Diamond Alkali Co., Cleveland. Kits include reagents, dropper and graduated test tube in which determinations are made. **(H)**

Process Traced From Feed Tank to Scrubber



JUICE from Feed Tank A is brought to 210 deg. F. in Preheater B, then flash-boiled in Vaporizer C. Vapor, separated at D, concentrated in Fractionating Column F and volatile aroma is liquefied in Ice Bath G.

Superior Juice Concentrate —Yet Only a Single Pass

Simultaneous flavor stripping and concentration nets product that reconstitutes with taste of starting juice

R. K. ESKEW, G. W. M. PHILLIPS, R. P. HOMILLER, and N. H. EISENHARDT

Eastern Regional Research Laboratory, Bureau of Agricultural & Industrial Chemistry, Agricultural Research Administration, USDA, Philadelphia

Just one pass—rather than two—will produce a full-flavored concentrated grape juice. This has now been demonstrated by a new process developed at Eastern Regional Research Laboratory.

■ **In this improved technic, essence is recovered and desired concentration attained simultaneously. And the reconstituted beverage is equivalent to the starting juice in both flavor and aroma.**

In an earlier process[1], full-flavored juice concentrates were made by stripping off only that portion of the juice necessary to release the volatile aroma. This stripped juice was further concentrated by vacuum evaporation. We found, however, that with improvements in evaporator design it is possible—at least with grape juice—to combine the steps of flavor stripping and concentration, conducting them simultaneously in the same equipment without damaging the juice by heat.

This is of interest, especially when a high degree of concentration of the stripped juice is not required. An example is frozen sweetened Concord grape juice concentrate of about 47 deg. Brix. Such a product is now made commercially. The juice is first concentrated to approximately 33½ deg. Brix, then sucrose is added (generally about 82 percent by weight of the natural grape sugar solids in the original juice). When diluted with three volumes of water to one of concentrate, the resulting beverage is a sweetened juice of about 14 deg. Brix.

Our work has resulted in a product similar to this but with a superior flavor. This is accomplished by restoring to the concentrate the aroma, which in conventional processes may be lost. In the finished product the essence-to-grape solids ratio is the same as that of the starting juice.

The starting material can be commercially pasteurized Concord grape juice of 15.5 deg. Brix that has (1) been stored under the customary conditions used to precipitate the argols and then (2) passed through a 30-mesh screen to remove the precipitate. To reach the required 33½ deg. Brix, it is necessary to vaporize 59.6 percent by volume of the juice. This can be done in a single pass without heat damage because as described below, the improved design of the preheater and vaporizer requires only a short retention time.

Operations Outlined

Referring to accompanying diagram in Preheater B the juice is brought to approximately 210 deg. F., at which temperature it passes directly into Vaporizer C. Steam pressure in the preheater jacket is approximately ⅓ psi., and in the jacket of the vaporizer 8 to 10 psi. The mixture of vapor and liquid discharging from the vaporizer passes to Separator D. Stripped and concentrated juice is rapidly cooled to room temperature in a water-jacketed cooling coil. The metered vapor, containing the aroma, is concentrated in the packed Fractionating Column F.

A portion of it is drawn off as essence, and the rest is returned to the column as reflux.

The essence is designated "100-fold by volume," since the rate of its draw-off is 1/100th of the feed rate of the juice. The latter rate is 1½ gal. per hr. Vent gases from the system are scrubbed in a chilled packed column countercurrently by column bottoms previously chilled to a temperature of 40 deg. F. Scrubbed vent gases and the column bottoms are substantially free of aroma. That part of the column bottoms not required for scrubbing the vent gas is discarded.

Accumulation of essence is started after the column has been operated for 2 hr. on total reflux (the time previously determined by hold-up measurements as that required to produce 100-fold essence at the top of the column when the juice feed rate is 1½ gal. per hr.) The essence is then put into the concentrated stripped juice. To this is added sucrose, equivalent to 82 percent of the grape solids in the concentrate. Thus, 45 percent of the total solids in the mixture is sucrose. For example, to 0.96 gal. of 35.5 deg. Brix concentrate is added 0.023 gal. of 100-fold essence and 2.52 lb. of sucrose.

After thorough mixing to dissolve the sugar, the product is transferred to 6-oz. cans, quickly frozen in brine at **—20 deg. F., and stored at 0 deg. F.**

When reconstituted with three volumes of water, this product was found equivalent in taste and aroma to the starting juice. Addition of sugar to the extent of 82 percent of the grape solids had sweetened the starting juice, which was then diluted with water to 14 deg. Brix. This and all other organoleptic evaluations were made by a taste panel skilled in the detection of slight differences in taste and aroma.

Unsweetened Concentrate

Using the same apparatus, it is possible to prepare (by a greater degree of vaporization during stripping) an unsweetened concentrate without damage to the flavor.

Pasteurized Concord grape juice such as was used in the above process is fed to the evaporator at the rate of 1.23 gal. per hr. Sufficient steam is used in the jacket of Preheater B to bring the juice to 210 deg. F. Approximately 73 percent by volume of the juice is then vaporized in Vaporizer C, the steam pressure in the jacket being adjusted and controlled to achieve this vaporization. Stripped juice, concentrated to approximately 48 deg. Brix, flows from Separator D at the rate of 0.33 gal. per hr. and is quickly cooled to about 80 deg. F.

From Separator D, the vapor and its associated aroma pass to Fractionating Column F. After the column has been operated for 2½ hr. on total reflux, essence is withdrawn from the reflux splitter at the rate of .0123 gal. per hr. Column bottoms are thus produced at 0.888 gal. per hr.

In operating Vent Gas Scrubber G, column bottoms are recirculated to the scrubber at the rate of 0.8 gal. per hr. Both the vent gases and discarded column bottoms will be substantially free of aroma.

To 0.62 gal. of the cooled juice concentrate there is added 0.023 gal. of essence. This is the quantity derived from the juice going into the concentrate. Thus 0.64 gal. of full-flavor unsweetened grape juice concentrate is obtained. After thorough mixing, the product is transferred to 6-oz. cans and then quickly frozen in brine at -20 and stored at 0 deg. F.

On reconstitution with three parts of water to one of concentrate, which gives a juice of 14 deg. Brix, the product was, for all practical purposes, indistinguishable in taste and aroma from the starting juice diluted with water to 14 deg. Brix. A further comparison was made with juice of the same Brix, reconstituted from a frozen concentrate of 47 deg. Brix made by a modification of the "double essence" process[2]. The modification consisted only in concentrating the stripped juice under vacuum to 48 instead of to 68 deg. Brix. Juices from the two types of frozen concentrate were indistinguishable.

Pending data on keeping quality, we can conclude that frozen sweetened or unsweetened concentrated Concord grape juice of good initial quality can be made by either of the following processes:

A. Vaporize in the essence unit sufficient juice to obtain, in one pass, the desired Brix (about 60 percent vaporization for sweetened juice and 72 percent for unsweetened juice), add the essence to the cooled juice concentrate (in making sweetened juice add sugar to the extent of 82 percent of the grape solids), package, and freeze.

B. Vaporize 25 percent of the juice in the essence unit and recover a first essence, complete the evaporation of the stripped juice to about 47 deg. Brix (or 33½ deg. Brix for sweetened concentrate) at a vacuum of at least 27½ in., recover a second essence by stripping 25 percent from the condensate obtained during the vacuum evaporation, incorporate both essences in the juice concentrate (adding sugar if desired), package, and freeze.

Equipment for Commercial Operation

In preparing both sweetened and unsweetened concentrates by this process, entailing simultaneous essence stripping and concentration, it was necessary to greatly reduce the rate of juice flow through the preheater and vaporizer. For the fractionating column was originally designed to accommodate only the vapor necessary for release of aroma and not the additional vapor incident to juice concentration. Thus, a unit designed to achieve the two operations simultaneously should have a column much larger with respect to the evaporator than ours had.

It is at once apparent, however, that there is no reason why vapor evolved in concentration of the juice, beyond the point where the aromas are substantially all released, need be sent to the column. A unit expressly designed for this process would, therefore, have two vaporizers. The first would merely strip out the volatile flavors, which would then pass to the fractionating column. The stripped juice would then pass to the second vaporizer, also operated at atmospheric pressure, and the vapors evolved there could be discarded to the atmosphere without condensation. Such a unit could also be used for making apple juice concentrates.

The second vaporizer, consisting merely of a system of tubes of small diameter and a pump for forcing the liquid through them at extremely high velocity, would probably cost much less than the conventional vacuum pan with its condenser and vacuum pump. It should also be less expensive to operate, since steam consumption would be slightly less than that of a vacuum pan, and no cooling water would be required. By using a portion of this vapor to preheat the juice, a further saving in operating cost could be obtained.

The question logically arises as to whether the juice could be subjected to two atmospheric evaporations without heat-damage. Further research is planned to establish this point. It seems probable, however, that this two-stage evaporation would not damage Concord grape juice, since the total effect of heat in a properly designed unit need be no greater than the heat effect resulting from operation of the single-stage evaporator far below its rated capacity, as was done in these experiments.

Storage tests are being carried out at 0 deg. F. on both the sweetened and unsweetened concentrate. The stored samples will be evaluated organoleptically in comparison with the same products stored at the temperature of solid carbon dioxide.

Concerning the manufacture and use of these volatile fruit flavor concentrates (essences), it should be noted that such operations are subject to

regulations of the Bureau of Internal Revenue, (*Federal Register*, 5869-79, Sept. 27, 1949).

References and Additional Literature

1. Homiller, R. P., Phillips, G. W. Macpherson, Eskew, R. K., and Eisenhardt, N. H., "Two-Pass Concentration Technic Obtains Full-Flavor Grape Juice," Food Industries, 22, 1026-28, 1950.

2. Walker, L. H., Nimmo, C. C., and Patterson, D. C., "Preparation of Frozen Apple Concentrate," Presented at Decennial Conference of IFT, Chicago, May 21-26, 1950.

3. Milleville, H. P., and Eskew, R. K., *Recovery and Utilization of Natural Apple Flavors.* USDA, Bur. Agr. & Ind. Ch. AIC-63 (Eastern Regional Research Laboratory), Sept. 1944, with supplement of April 1945. (Processed).

4. Milleville, H. P., and Eskew, R. K., "Recovery of Volatile Apple Flavors in Essence Form," *Western Canner and Packer*, 38, 51-54, Oct., 1946.

5. Griffin, E. L., Jr., Davis, L. L., Eisenhardt, N. H., and Heller, Margaret B., "New Progress in Fruit Flavor Recovery," Food Industries, 21, 1545-47, 1694, 1949.

6. Phillips, G. W. M., Eskew, R. K., Claffey, J. B., Davis, R. A., and Homiller, R. P., "Experimental Unit for Volatile Flavor Recovery," to be published.

Preserved-Milk Goal Seen Nearer

—due to new promise in recent progress. But hurdles still lie ahead for technicians seeking to develop a completely satisfactory method

ATTAINMENT of method that will prove entirely satisfactory in preserving milk in such a way as to yield a product comparable in quality to market milk—still lies in the future. ■ **Nevertheless, important technical advances made in recent years indicate that it may be possible, in the period immediately ahead, to preserve milk, either in frozen or in sterilized form, that will be acceptable as beverage milk.**

In fact, it is possible to do this now—but with serious limitations on the conditions and time of storage. Even with the solution of technical difficulties, however, it is to be remembered that economic factors may delay or prevent widespread use of preserved forms of milk.

The above clarification of the milk-preserving picture comes from B. H. Webb, of the USDA's Dairy Products Research Laboratories. This gage of the question is contained in his statement, "Processes for Preserving Fluid and Concentrated Milks, and Their Potentialities," an abstract of a paper presented before the Laboratory Section at the recent convention of the Milk Industry Foundation.

Methods Assessed

Along with the accompanying tabulation of the newer methods, the following specific points are made:

Pasteurized, homogenized milk of good quality may be frozen and held at −10 deg. F. or lower for at least 4 months without serious loss in taste.

Pasteurized milk concentrated to a solids content of 36 percent, homogenized, frozen and held at −10 deg. F. or lower will remain acceptable during storage periods up to at least 2 months.

Homogenized milk sterilized at 285 deg. F. for 15 sec. and aseptically canned will have a mild heated flavor, which will gradually give way to a stale flavor after 4 months of storage at room temperature.

Milk concentrated to half its volume, homogenized, sterilized at 285 deg. F. for 15 sec., and aseptically canned will have a heated flavor resembling that of boiled milk, which will gradually give way to a stale flavor after 10 weeks of storage at room temperature.

When these milks are held for longer periods of storage than those indicated, characteristic defects generally appear which render the products unacceptable as beverage milk.

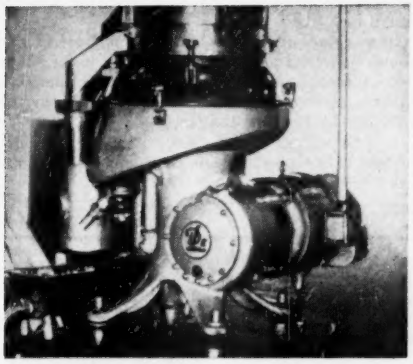
Coffee and whipping cream may be sterilized in the can at 245 deg. F. for 12 min. or in bulk at 285 deg. F. for 15 sec., then aseptically packaged. The cream will have a mild heated flavor. Here it is to be noted that difficult problems concerned with separation of fat during storage still remain to be solved.

DETAILS OF NEWER METHODS of Manufacturing and Storing Frozen and Sterilized Milks and Sterilized Cream

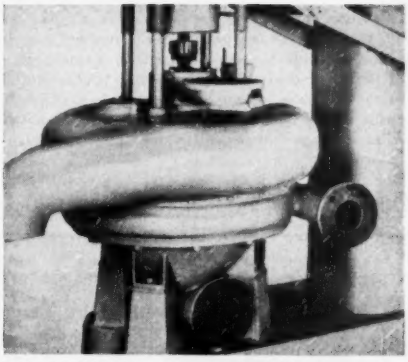
Based on published papers and also unpublished work conducted by Bureau of Dairy Industry, including investigations on frozen milk by R. W. Bell and T. J. Mucha.

Product	Heat Treatment	And Its Purpose	Processing Steps	Means of Preservation	Acceptability Before Storage	Storage Conditions Required To Maintain Acceptability: Temp. (Deg. F.)	Storage Conditions Required To Maintain Acceptability: Time (Weeks)	Common Storage Defects
Frozen, Pasteurized Milk	155 deg. F. for 30 min. *or* 170 deg. F. for 1 min.	Pasteurize, destroy lipase, defer oxidized flavor.	Homogenize, cool, package.	Freeze at −10 deg. F.	Excellent.	−10	16	Oxidized and old, stale flavors; protein slowly becomes insoluble.
Frozen Concentrated Milk	155 deg. F. for 30 min. *or* 170 deg. F. for 1 min.	Pasteurize, destroy lipase, defer oxidized flavor.	Concentrate under 28 in. vacuum to 36 percent T. S., homogenize, cool, package.	Freeze at −10 deg. F.	Very good, but lacks fine flavor; "flat."	−10	8	Oxidized and old, stale flavors; protein slowly becomes insoluble.
Sterilized Whole Milk	160 deg. F. for 15 sec.	Prepare for homogenization.	Homogenize, sterilize, aseptically package.	Heat to 285 deg. F. for 15 sec.	Very good, but with mild "heated" flavor.	70	16	Gradual development of a stale flavor and formation of a cream layer.
Sterilized Concentrated Milk	190 deg. F. 10 min.	Destroy lipase, impart heat stability.	Concentrate under 28 in. vacuum to 26 percent T. S., homogenize, sterilize, aseptically package.	Heat to 285 deg. F. for 15 sec.	Good, but with "heated" flavor.	70	10	Development of a stale flavor, separation of a cream layer on top and protein on bottom.
Sterilized Cream (18 percent fat)	176 deg. F. for 1 to 10 min.	Impart heat stability.	Homogenize, sterilize, aseptically package.	Heat to 285 deg. F. for 15 sec.	Very good, less "heated" flavor than similarly treated milk.	70	16	Gradual formation of a cream layer and development of a stale flavor.

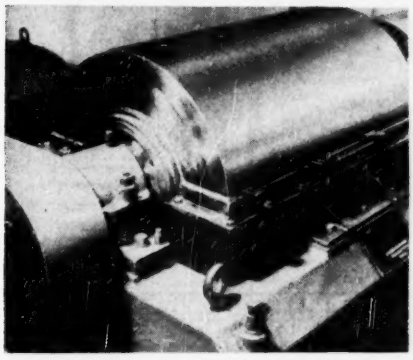
A SPECIAL FOOD INDUSTRIES REPORT



NOZZLE TYPE: Speeds butter making



VALVE TYPE: Ups corn starch yield



BOWL TYPE: Gives top-quality protein

BASKET TYPE: Improves vegetable dewatering

Centrifuging's Big Strides

Today's skilfully refined machines continuously separate practically any liquid-liquid or liquid-solid mixture. Solids are classified, too. And the numerous new applications stemming from the refinements are bringing solid profits to canners, packers, dairymen, millers and many others

ARTHUR V. GEMMILL
Assistant Editor, "Food Industries"

Practical refinements and profitable applications—rather than basic design changes—have constituted the outstanding developments in recent years in the centrifugal separation field.

The technical modifications have brought great improvements in the performance of centrifuges, and these meanwhile, have been coupled with unusual success in working out new applications for the machines.

■ **The influence of these new strides is particularly striking: More centrifuges have been manufactured since 1940 than were made in all the previous years of their history.**

New food-processing uses for these units are constantly being discovered. In numerous cases—such as the continuous recovery of grease and protein from meat-packing wastes—these latest applications have served to form the

bases of completely new processes. They have, in fact, gone even further. For in several instances they have played star parts in the creation of entirely new industries. The recovery of fish solubles from stickwater is a notable illustration.

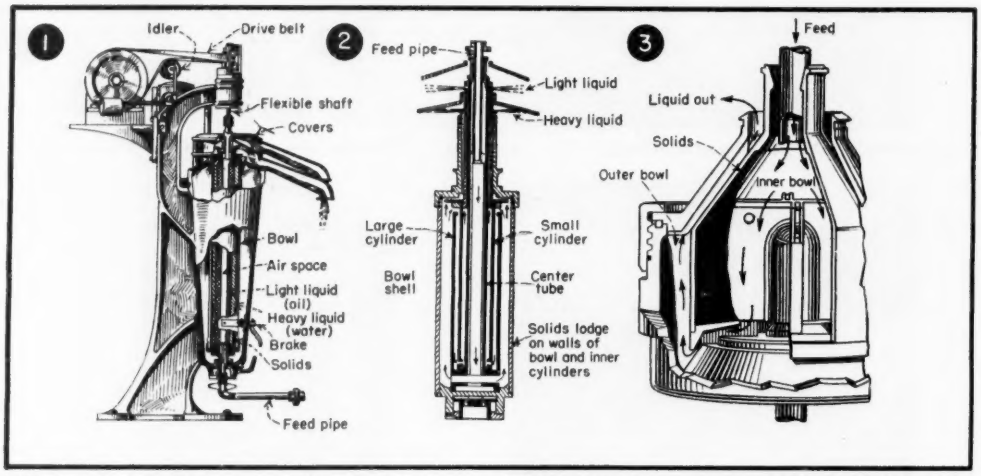
With this same story being repeated in a number of other fields, versatility is the word for the modern centrifuge. To touch on this broader perspective, mention may be made of its major contributions in atomic processes and in production of blood plasma and antibiotics. And of course its role in the many technics of industrial purification—such as employed with lubricating and fuel oils—are well known.

There are, basically, two kinds of centrifuges: (I) Settling machines, the mechanical equivalent of the gravitational settling tank, and (II) centrifugal filters in which the solid phase is supported on a porous surface, or screen, that permits passage of the fluid under the acceleration of centrifugal force.

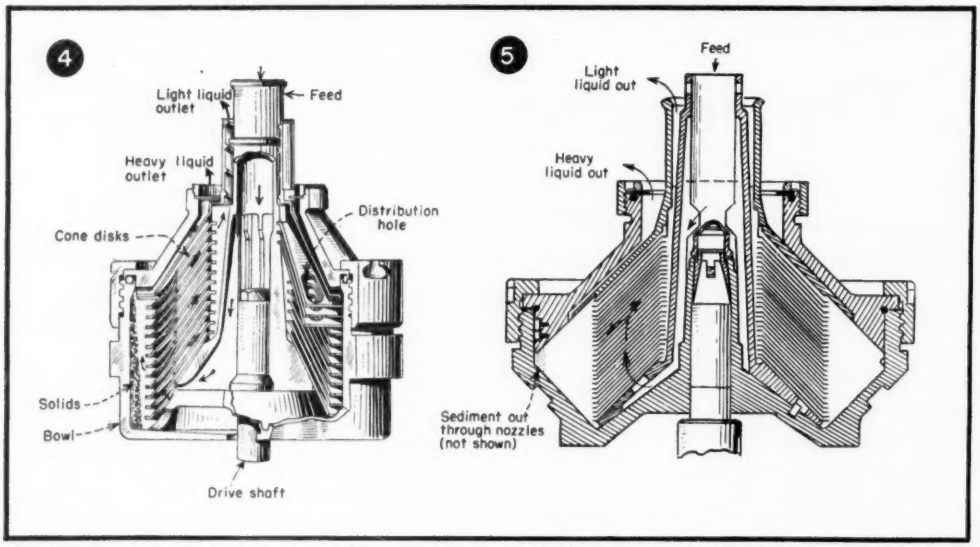
In machines of the first class, the mixture of liquids, or liquids and solids, is caused to stratify under the application of centrifugal force. The separated components are either drawn off continuously, or one is removed intermittently by cleaning the bowl.

In units of the second class, solids are collected on the surface of the basket, while the liquid passes through the

Bowl Designs Are Influenced By Applications



FIGS. 1, 2, 3. Sharples Super-Centrifuge (left) is characterized by small diameter hollow bowl. National Acme bowl (center) may be equipped with cylinders or filters to lengthen path of travel. De Laval Multiple Clarifier (right) employs a bowl within a bowl to increase sediment space. The bowl is pear-shaped, but contains no disks.



FIGS. 4, 5. Standard disk-bowl (left) contains nest of perforated disks that stratify liquid. Nozzle-discharge bowl (right) has orifices which emit solids continuously, together with a small amount of heavy liquid.

Many Types of Centrifuges Are Available For the Food Industry

Type & Design	Speed	Solids Discharge	Applications*	Unit and Manufacturer
I. SETTLING				
A. Tubular Bowl:	1. High.....	Manual.....	sil, cl, l-ls.....	Super-Centrifuge (Sharples Corp.)
	High.....	Manual.....	sil, cl, l-ls.....	National Acme (The National Acme Co.)
	High.....	Manual.....	cl.....	Multiple Clarifier (The De Laval Separator Co.)
B. Disk Bowl:	1. Medium.....	Manual.....	sil, cl, l-ls.....	Industrial Separator (The De Laval Separator Co.
	Medium.....	Manual.....	sil, cl, l-ls.....	Columbia Westfalia (Columbia Westfalia Centrifuge, Inc.)
	Medium.....	Manual.....	sil, cl, l-ls.....	D-2 (Sharples Corp.)
	2. Medium.....	Nozzle.....	sil, l-ls, cl, ts, ds.....	DH-2 (Sharples Corp.)
	Medium.....	Nozzle.....	cs, l-ls, cl, ts, ds.....	Merco (Merco Centrifugal Co.)
	Medium.....	Nozzle.....	l-ls, cl, ts, cs.....	Nozzle-Matic AC-VO (The De Laval Separator Co.)
	3. Medium.....	Valve.....	l-ls, cl, ts.....	Nozzle-Matic AC-MO (De Laval)
	Medium.....	Valve.....	cl, dc.....	Multi-Matic (De Laval)
	Medium.....	Valve.....	l-ls, cl, dc.....	DG-2 (Sharples Corp.)
	Medium.....	Valve.....	l-ls, cl, dc.....	DV-2 (Sharples Corp.)
C. Solid Bowl:	1. Low.....	Continuous conveyor..	cs.....	The Bird Continuous Classifier (Bird Machine Co.)
	Low.....	Continuous conveyor..	ds, ts.....	The Bird Solid Bowl Filter (Bird Machine Co.)
	Medium.....	Continuous conveyor..	ds, dc, cs, cl.....	Super-D-Canter (Sharples Corp.)
	Low.....	Continuous conveyor..	dc, ds, sil.....	CEM Continuous Centrifuge, Solid Bowl Type (Condenser Service & Engineering Co.)
	2. Low.....	Automatic knife.....	ts, cl.....	ter Meer, Type HF (Baker, Perkins, Inc.)
II. FILTER				
A. Vertical: Perforated Basket	1. Low.....	Power operated knife..	dc.....	Tolhurst Suspended Centrifuges (Tolhurst Div. Amer. Machine & Metals, Inc.)
	Low.....	Power operated knife..	dc, cl.....	The Bird Centrifugal (Bird Machine Co.)
	Low.....	Manual.....	sps.....	30-Minute Man (Tolhurst)
	Low.....	Manual or automatic knife....	dc.....	Hepworth (Hepworth Machine Co., Inc.)
	Low.....	Manual or automatic knife....	dc.....	Roberts (The Western States Machine Co.)
B. Horizontal: Perforated Basket	1. Low.....	Automatic knife.....	dc.....	Super-D-Hydrator (Sharples Corp.)
	Low.....	Automatic knife.....	dc, ts.....	ter Meer, Type HS (Baker, Perkins, Inc.)
	2. Low.....	Reciprocating pusher..	dc.....	ter Meer, Type S (Baker, Perkins, Inc.)
	3. Low.....	Continuous conveyor..	dc, ds, sil.....	CEM Continuous Centrifuge, Screen Type (Condenser Service & Engineering Co.)
	Low.....	Continuous conveyor..	dc, ds.....	The Bird Centrifugal Screen Filter (Bird Machine Co.)

*Legend: sil — Separation of immiscible liquids
cl — Clarification of liquids
l-ls — Liquid-liquid separation with removal of solids
cs — Classification of solids
ds — Dewatering sludges
dc — Dewatering crystals
ts — Thickening slurries
sps — Special services

accumulated mass and is caught in an annular casing which diverts it to the proper discharge point. Provision is made for purifying the separated crystals by washing.

I. SETTLING CENTRIFUGES. Classifying by design, there are three fundamentally different types of machines in this category:

A. TUBULAR BOWL, HIGH SPEED CENTRIFUGALS (see Fig. 1). These machines, characterized by a tubular bowl, of not over 6 in. diameter and several times this dimension in length, afford high centrifugal force—up to 13,200 times gravity for a 4-in. bowl operating at 15,000 rpm. and 62,400 times gravity for a 2-in. bowl at 50,000 rpm. Feed is admitted near the bottom of the bowl; solid particles are thrown out by centrifugal force and collect on the bowl's inner wall, and the clear liquid escapes from the top. When separating two immiscible liquids, suitable outlets, overflow weirs, and collecting covers are provided.

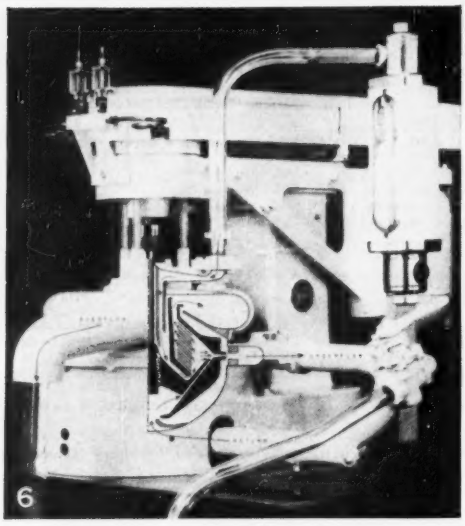
The bowl usually contains vertical baffles for accelerating the entering liquid and is sometimes equipped with internal cylinders or filters (Fig. 2). One machine, specifically designed for clarifying liquids, uses a bowl within a bowl to lengthen the path of travel (Fig. 3). Liquid flow is relatively continuous, only being interrupted at intervals for manual removal of accumulated solids. For special applications, bowls are equipped with heating or cooling coils.

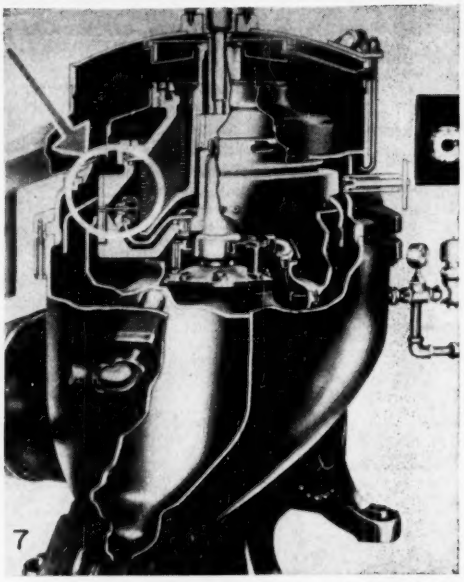
B. DISK BOWL, MEDIUM SPEED MACHINES. By far the greatest number of centrifugals in use in the food industry are of this type, largely based on the early design of De Laval. They have bowls that are larger in diameter and not as long as in tubular machines. A nest of perforated stratifying disks fills most of the interior of the bowl. (See Fig. 4).

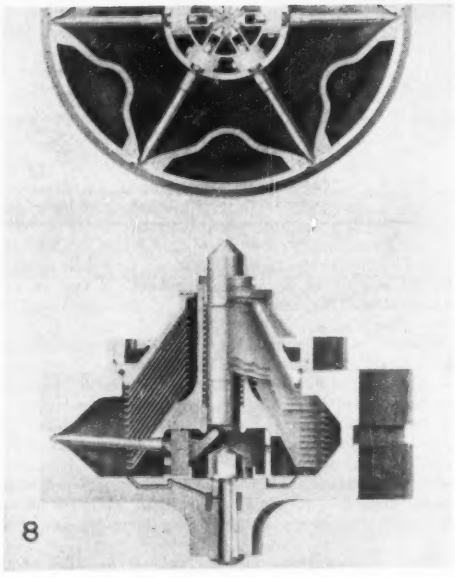
Whereas in the tubular-bowl high-speed machines the mixed materials usually enter at one end and discharge at the other, in the disk-bowl machines, they enter at the top and pass down through a tubular shaft to the bottom of the bowl, then upward through holes in the disks. The disks divide the liquid into thin layers, so that solids or particles of emulsified liquid have only a short distance to travel before being separated. The lighter material moves inward along the upper side of the disks, while the heavier liquid and solids move outward along the under side of the disks.

For any given design of bowl, relative densities of the two liquid components to be separated will establish a neutral zone corresponding to the boundary between the liquids. It is desirable, therefore, to introduce the feed as nearly as possible in this neutral zone. This is done by means of a series of vertical holes through the disks (as shown in Fig. 4). The position of the neutral zone can be adjusted by varying the size of the discharge lip for either or both of the liquids.

By changing the position of the neutral zone, it is possible to distribute the centrifugal effect between the two liquid components. In a cream separator, for example, it is desirable to exert the maximum force on the heavier component of the milk (the skim milk), because the amount of butterfat left in it must be reduced to a minimum. The







FIGS. 6, 7, 8. The Merco (top left) is a nozzle-discharge machine that uses internal circulation to concentrate and wash slurry. Sharples DV-2 (above) employs two automatic, vernier-set timers to operate valves (arrow) —one timer for frequency and one for duration of opening. De Laval Multi-Matic bowl (left) is divided into six conical compartments, each of which is equipped with a mechanically-operated valve for solids removal.

cream, on the other hand, must contain some skim milk for fluidity.

In a cream separator, therefore, the feed holes, and consequently the neutral zone, are brought near the center of the disks, so that the skim milk receives the greater exposure to the centrifugal force.

In a purifier for removing water from oil, however, the neutral zone will be moved to a region near the outer edge of the disks, for it is the lighter component, the oil, which must have the greater exposure. In either case, any solids that may be present will receive an even greater exposure, and will travel to the outside of the bowl, where they will be deposited in the space provided for sediment.

There are three different types of disk-bowl machines:

1. *Manual solids discharge.* This is conventionally designed for continuous liquid flow with intermittent solids removal.

2. *Nozzle-discharge.* A modification of the standard machine with continuous peripheral discharge of a fixed volume of sludge through orifices which are usually placed tangential to the bowl's circumference for power conservation (see Fig. 5). Some nozzle type machines use internal recirculation of the slurry in order to concentrate and wash it before final discharge (Fig. 6).

3. *Valve-discharge.* A peripheral-discharge type from which sludge is emitted at approximately uniform consistency through valves controlled either externally or by build-up of solids within the bowl, (Figs. 7 and 8).

C. SOLID BOWL. These are large-diameter centrifugals equipped with solid bowls for use in clarification work where the quantity of solids is small in relation to the liquid, or where the solids are not of a readily filterable type but are fairly easy to settle. There are three classifications of this machine:

1. *Continuous solids discharge horizontal type.* This unit is usually in the form of a tapered rotor with a helical conveyor operated at a differential speed with respect to the rotor (Fig. 9). Several machines of this type are also made with cylindrical bowls. The pond of liquid covers most of the inner surface of the bowl, and solids are submerged in the liquid until just before they are discharged.

2. *Automatic-batch.* This machine (Fig. 10) has a horizontal basket with imperforate walls. A skimming nozzle is provided for continuous removal of liquid, and the feed is projected against the end of the basket so that the longest

possible travel is provided before the discharge point is reached. Solids discharge is intermittent and automatic.

3. *Vertical bulk.* Here, an imperforate basket is used in a suspended centrifugal. The basket is exactly analogous to the bowl of a tubular, high speed machine, except that the diameter is much greater and the speed much lower. Solids are removed manually. This machine has found few applications in the food field.

II. FILTERING CENTRIFUGES. Most common machine of this type makes use of a perforated basket of 40-in. diameter or more (even up to 72-in. dia.) It is operated at speeds of 600 to 1,500 rpm., with about 1,200 rpm. the most common and is largely used for dewatering of crystals.

This machine is made in two types:

A. VERTICAL BASKET, built both in the under-driven model and as a basket suspended from a driven shaft (Fig. 11). In both types, batches are handled intermittently, and it is necessary to slow the machine, almost or actually to a stop, for removal of accumulated solids.

In the top-suspended machine, slurry is admitted to the rotating basket until sufficient crystals have been collected. Then the feed is shut off, the crystals are washed, spun dry, and discharged through an opening in the bottom of the basket, usually by an unloading knife. The under-driven basket is almost always unloaded through the top.

B. HORIZONTAL BASKET. This machine is characterized by the automatic discharge of dewatered and washed crystals while the basket is turning at full speed. There are three classifications of this unit.

1. *Automatic discharge.* This is a batch-type machine used principally for the recovery and dehydration of crystals. The operations of loading, rinsing, drying and unloading are carried out in a series of automatically controlled, consecutive steps (Fig. 12).

2. *Reciprocating pusher discharge.* This machine is continuous in its operation. Dried crystals are moved to the front of the filter screen by means of a reciprocating pusher and fly off into a dry collector housing. The mother liquor after passing through the screen is collected in a wet housing (Fig. 13).

3. *Screen conveyor.* This is a continuous, fully-automatic machine. Here, feed from a perforated pipe is sprayed into the interior of the bowl. The liquid escapes through slots, leaving a cake of solids which is moved to the discharge point by a conveyor rotating slightly slower than the centrifuge bowl (Fig. 14).

Many Services Performed

The principal uses made of centrifuges in the food industry are:

1. **Separation of immiscible liquids.**
2. **Clarification of liquids.**
3. **Liquid-liquid separation with removal of solids.**
4. **Dewatering of crystals, and**
5. **Concentration of products preparatory to drying or further processing.**

The high-speed tubular centrifuges (Types IA in accompanying table) are very satisfactory for separating nonvolatile liquids containing less than 0.5 percent solids. Flow of liquid through these machines is continuous, but the bowl must be stopped at intervals for removal of accumulated solids. This clean-up, which normally requires about 15 min., can be reduced to less than 5 min. when a spare bowl is provided.

Disk machines (Types IB) are also widely used for separating immiscible liquids. Due to the fact that the disks divide the liquid into thin layers, usually not more than 1/20 in. in thickness, they are more effective in separating certain emulsions than are tubular machines.

Disk centrifuges are more complicated and expensive, and they take longer to clean than the tubular type. However, they will hold more dirt and, consequently, have a longer operating cycle than tubular machines.

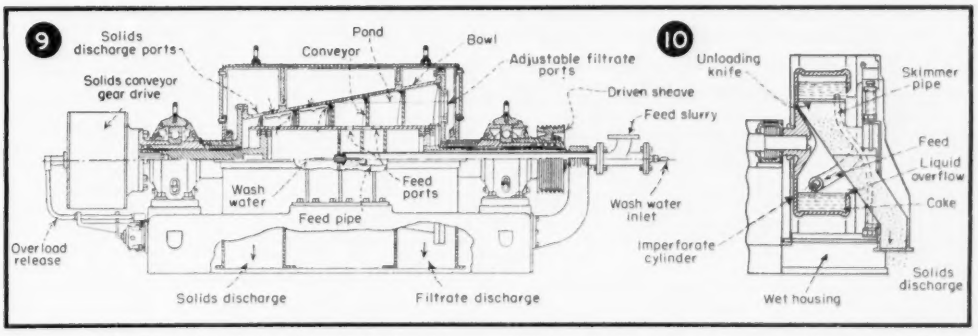
Clarification of Liquids

In this operation, comparatively small amounts of solids are removed from a liquid to improve its quality. Examples are the clarification of milk (prior to homogenization to remove unsightly leucocytes) and the polishing of fruit juices.

High-speed tubular machines (Types IA) are extensively used for clarification. The bowl has a single liquid discharge, and the solids which collect on the walls must be removed manually.

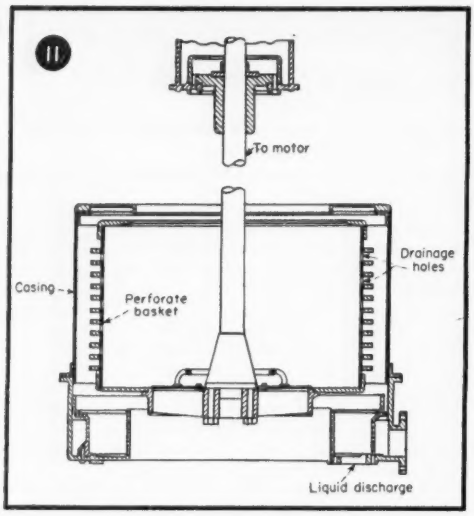
A bowl within a bowl is used in the De Laval Multiple Clarifier (Fig. 3) to lengthen the path of travel of the liquid. No disks are used, and the bowl is empty except for the inner chamber and accelerating vanes. The National Acme clarifier may be equipped with inner cylinders to effect more complete removal of solids. In this unit the

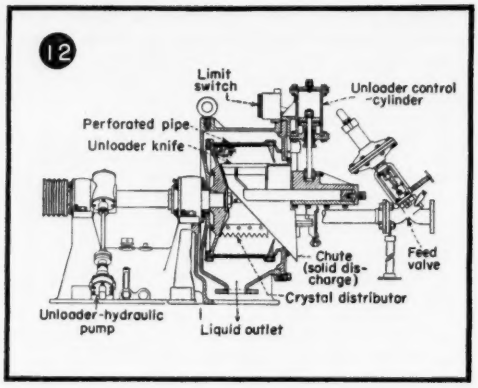
Solid-Bowl Machines Filter Hard-To-Drain Materials

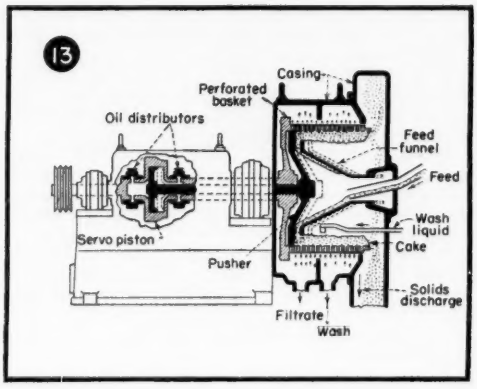


FIGS. 9, 10. In the Bird Centrifugal Filter (left), feed is delivered to a rotating bowl, solids are moved forward (as fast as they are deposited) by a screw conveyor that travels slightly slower than bowl. Solids and filtrate discharge is continuous. The ter Meer Universal Clarifier (right) is a horizontal, solid bowl machine in which filtrate is discharged over a lip in bowl. At intervals, feed is shut off, a skimmer removes excess liquid from bowl, and cake is unloaded automatically by knife. A short settling period, 1 to 2 min., is usually sufficient.

Filtering Centrifuges Dewater and Wash Crystals







FIGS. 11, 12, 13. Hepworth vertical perforated-basket centrifuge (above) is typical of those used in sugar refineries to separate crystals from mother liquor. Syrup removal, washing, and drying are controlled automatically. Loading and unloading are manually regulated. Sharples Super-D-Hydrator (top right) is a horizontal perforated-basket machine in which all operations are performed automatically. Washed and dried crystals are removed by an unloading knife. The ter Meer Continuous Centrifugal (right) employs a pusher for removal of dried and washed cake.

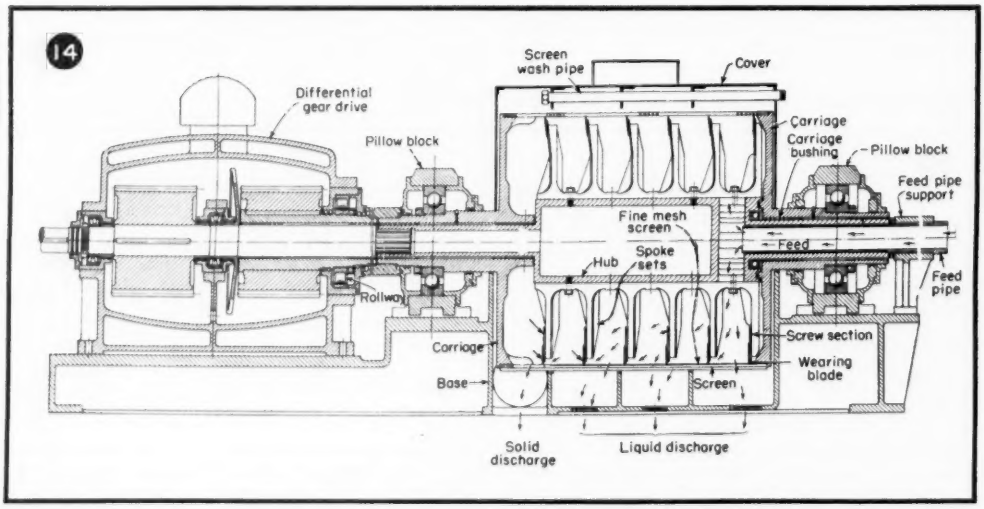


FIG. 14. CME Continuous Screen Centrifuge has screw conveyor that moves dewatered crystals forward to discharge ports. Crystal and filtrate discharge is continuous. Washing equipment may be included.

liquid enters the bowl through the center tube and passes successively through three chambers, formed by the cylinders and bowl shell, before discharging into the bottom pan (Fig. 2).

For clarifying liquids containing small amounts of solids, standard disk bowl machines (Types IB1) are frequently used. And nozzle- and valve-discharge machines (Types IB2 and IB3) are employed where the solids will discharge satisfactorily from the valves or nozzles.

The Sharples DV-2 has externally controlled peripheral valves. Valve control may be manual, time cycle, or on bases of effluent clarity. This machine has found considerable recent application in the selective clarification of pineapple juice and the separation of solids from serum in tomato juice.

De Laval Multi-Matic separators are designed to remove a relatively large amount of solid matter from a liquid and simultaneously clarify the liquid so as to discharge a clear effluent. Operation of the six radial valves (Fig. 8) is intermittent and is regulated by a timing device. Applications are: Removing fines from malt liquor, and separating solids from the protein-containing liquid in the production of soya bean protein.

Solid-bowl units (Types IC) are used for the clarification of liquids whose solids settle out fairly easily. In these machines, solids accumulate in the basket and are either removed continuously by a screw conveyor, or intermittently with a knife unloader. Since many of these machines generate a maximum force of only 1,800 times gravity, as against as much as 13,000 times gravity in tubular machines, the effluent usually contains more than 1 percent solids. Capacities are large, however, ranging from 10 to 300 gal. per min., and operations may be fully automatic.

Separation With Solids Removal

When more than 0.5 percent solids is present in liquids to be separated, manual removal from the separator bowl becomes costly. Nozzle- and valve-discharge centrifuges (Types IB2 and IB3) are most satisfactory for this operation. The nozzle machines automatically discharge solids as a concentrated slurry and separate two liquids simultaneously. The nozzles discharge the slurry tangentially away from the direction of the bowl's rotation, and the two separated liquids are discharged over weirs at the top of the bowl as in the usual separators.

The Sharples DH-2 and De Laval Nozzle-Matic AC-VO are two widely used disk centrifuges of this type. They are employed for the separation of citrus oil from water containing small amounts of peel, for separating fish oil from press liquor with constant removal of solids, and for separation of oil from fish stickwater.

The Merco centrifuge (Fig. 6) is a large rotor, nozzle-discharge, disk-bowl machine that rotates at from 2,900 to 8,400 rpm. Throughput ranges from 1 to 200 gal. per min. An exclusive feature, the Merco return, sends a major part of the concentrate that is discharged from the nozzles back to the rotor. By action of this recycling, the underflow concentration can be built up to any desired degree as long as it will continue to flow.

Using this return feature, the solids can be washed continuously with neutral liquor as the separation takes place. This machine has found wide use in the starch processing field where it has entirely replaced tables as a means of separating starch from gluten, fiber and the soluble components of corn.

Valve-discharge machines dewater solids more effectively than nozzle-discharge centrifuges. However, the type of solids that can be discharged is more limited. Therefore, their applications in the food industry are fewer. They are used in vegetable oil refining for clarification of solvent extracted cottonseed miscella, and for the degumming of oils prior to refining. The De Laval Nozzle-Matic AC-MO and the Sharples DG-2 contain hydraulically balanced valves built into orifices in the shell of the bowl. Solids are discharged in a much dryer state than is possible with the nozzle-type machines.

When the solids float on the light liquid, or at the interface between the liquids, none of the above mentioned machines will make the separation. In this case it is usually more satisfactory to remove the solids by a filter or a basket centrifuge and then separate the two liquids in a high speed centrifugal.

Notable New Uses for Centrifuges

- ***Cannery:*** **To clarify fruit and vegetable juices**
- ***Refinery:*** **To produce top-quality lard**
- ***Fishery:*** **To reclaim oil and meal from stickwater**
- ***Dairy:*** **To separate cream from cold milk**
- ***Brewery:*** **To remove sludge from hot wort**

These and many other applications are described in the accompanying special report.

Dewatering Crystals

For the operation of dewatering crystals, perforated basket centrifuges (Types IIA and IIB) are most satisfactory. The principal application in the food industry is to sugar refining.

Here, the function of the centrifuge is to separate sugar crystals from the unwanted impurities in solution in the mother liquor from which the crystals are precipitated. For this purpose, large diameter, vertical, perforated basket type centrifuges are used. The machines have baskets of 40-in. diameter and 24 in. deep, and they operate at speeds up to 1,800 rpm.

Batch operations are almost exclusively used in the sugar industry. Unloading is done with the basket stopped, or rotating at about 50 rpm. Some installations have mechanically operating equipment so arranged that the centrifuges can go through their normal cycles of loading, spinning, washing, drying and unloading without any attention from the operator. However, due to hazards that might result from these heavy machines rotating at high speeds, it is generally considered desirable to have the operator perform some functions of each cycle.

Frequent starting and stopping of the basket requires that the drive be rugged, and that a good clutch or coupling and good lubrication be provided. The centrifugals may be powered either by a direct connected electric motor for each machine, a line shaft driven by motor or engine (the shaft being connected by clutch to each machine of a battery of centrifuges), or a water motor direct-connected to each machine.

The crystals are washed by spraying water onto the cake from suitable nozzles. The wash leaves the casing through the same tangential outlet as the mother liquor but may be kept separate from the liquor by adjusting valves in the outlet line.

An entirely new application for the perforate basket type centrifuge is the dewatering of fresh vegetables prior to pre-packaging. In the case of spinach, it was found that about 20 percent of the load-in weight was removed as water. For this purpose a 30 in. stainless steel dump basket unit revolving at 700 rpm. is used. On the basis of a 3-min. cycle, this unit will yield an estimated 952 lb. of extracted spinach per hr. The machine has also been used on raisins. Other indicated applications are the dewatering of: Kale, slaw, salad mix, soup mix, dehydrated potatoes, pickle relish, chow chow, blanched almonds, cherries, and removal of eggwhite from crushed shells.

Note Important Roles Played By Centrifugal Units In the Representative

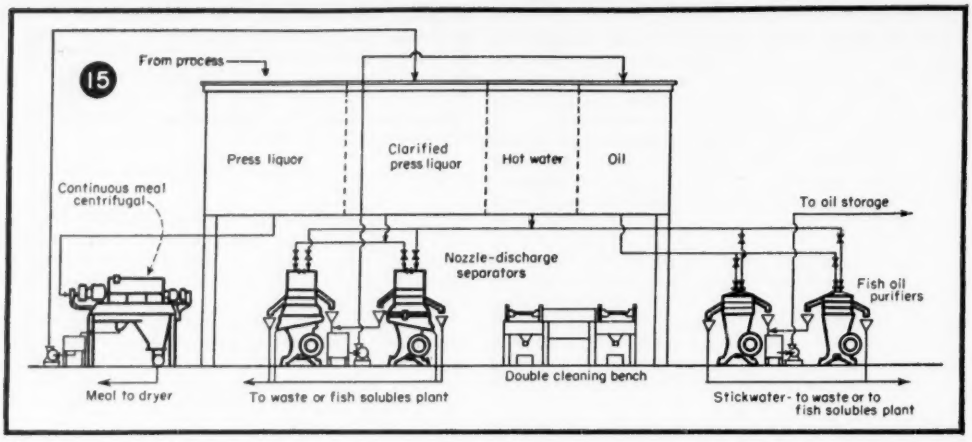


FIG. 15. FISH REDUCTION: Here, solid bowl centrifuges continuously remove meal from press liquor. Then nozzle-discharge units make 3-way separation (oil, stickwater, and wet solids).

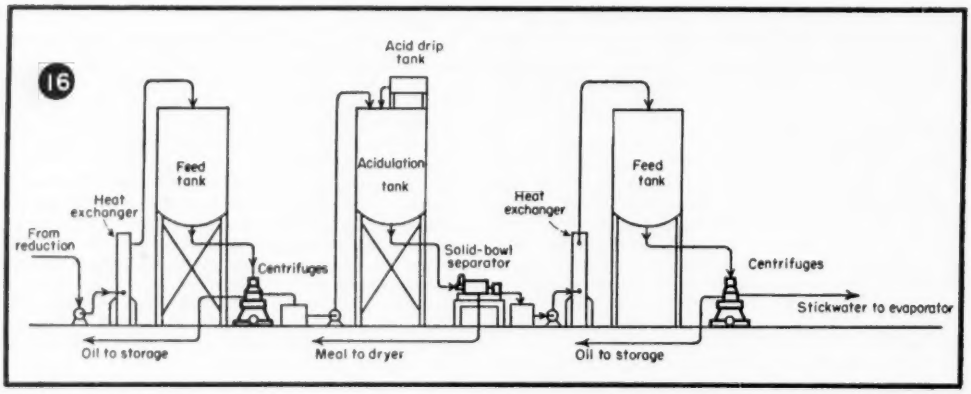


FIG. 16. FISH STICKWATER: Proteins in stickwater (from above process) are coagulated by acid, and oil is released. Solid bowl centrifuges remove proteins, oil is recovered in nozzle-discharge units.

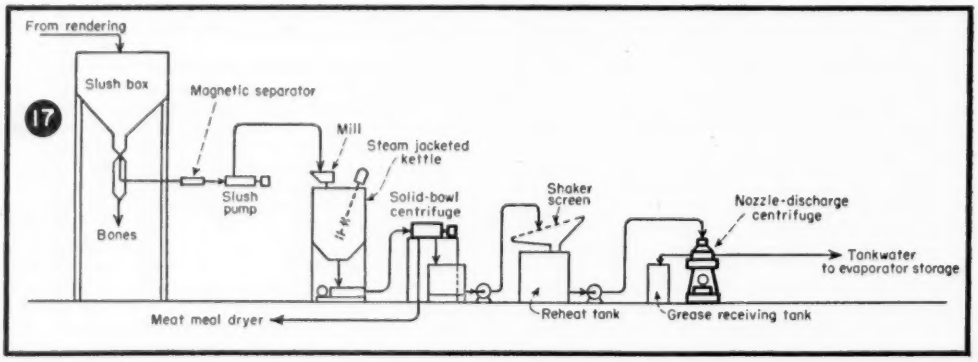


FIG. 17. MEAT PACKING, TANKHOUSE PROCESS: High quality meat meal is recovered continuously with solid bowl centrifuges. Grease is removed from tankage by nozzle-discharge machines.

Food Processes Pictured Here

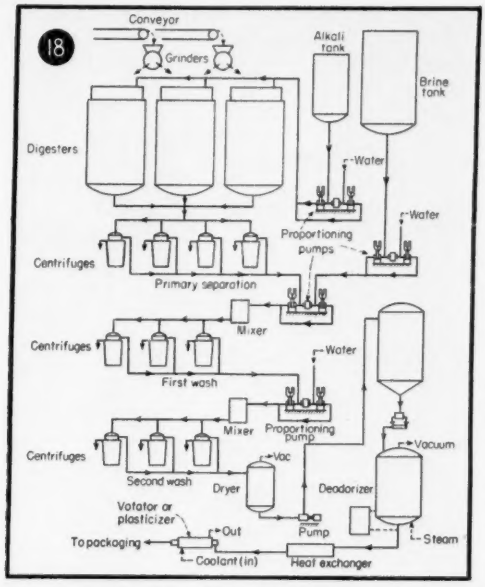


FIG. 18. IMPROVED LARD PROCESS: Introduction of Super-Centrifuges at three points made this operation practicable.

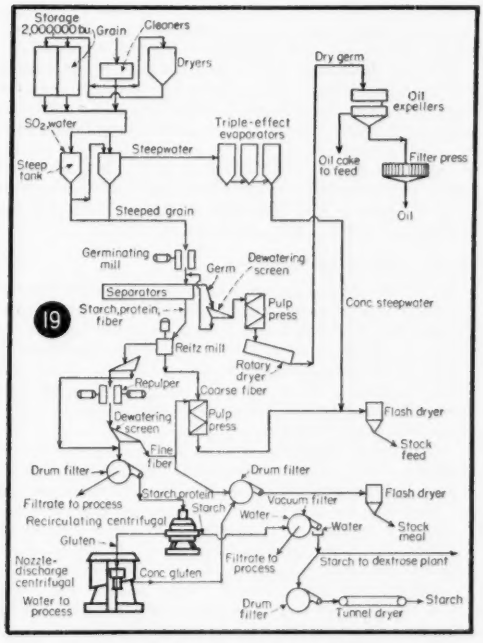


FIG. 19. CORN STARCH MANUFACTURE: Here, nozzle-discharge centrifuges recirculate and wash slurry, replacing starch tables. And standard nozzle-type units now make final gluten separation.

It is often desirable to thicken a dilute slurry in order to lighten the load on subsequent dewatering equipment. As an example, in the production of nutrient yeast the amount of water to be removed by drying is reduced many times by the use of yeast separators.

The operations are similar to those where liquids are clarified, except that the solids are usually the desired product. Nozzle- and valve-discharge machines (Types IB2 and IB3) are widely used for this purpose, as are also solid bowl units (Type IC).

Food Industry Applications

Centrifuges, as indicated in the accompanying box, have been put to many new uses that have promoted advanced processing in the food field, and a number of these outstanding applications will now be discussed.

In the dairy industry the greater acceptance of homogenized milk has made clarification a "must." For this purpose, disk-type, "air-tight" machines (Types IB1) with capacities up to 20,000 lb. per hr. are largely used. Recently, however, a tubular bowl clarifier has been introduced with capacities of 4,000 and 7,500 lb. per hr. Its big advantage lies in ease of cleaning the bowl, with consequent labor saving.

Increased production of 80 percent "plastic" cream and the successful introduction of several continuous butter making processes were made possible by improvements in disk-bowl centrifuges. Basically, these improvements were: Development of the "air-tight" separator, in which both feed and discharge are under pressure; modifications in the milk inlet sections of the bowl; relocation of cream distributor holes in the disks; and perfection of the valve-discharge type machine.

In the manufacture of plastic cream, 30 to 50 percent cream is separated in a standard disk-bowl cream separator (Type IB1). After pasteurizing, this cream is cooled to approximately 130 deg. F. and re-separated to 80 percent or higher in a machine equipped with the special heavy cream bowl.

In the continuous butter processes[1, 2], cream of 30 to 50 percent fat is re-separated to the desired fat content using a nozzle-discharge centrifuge (Type IB2). Capacities of standard "air tight" separators range up to 12,000 lb. milk per hr. Capacities of special heavy cream bowl separators are approximately 3,000 lb. 30 to 50 percent cream per hour. Patents have been issued for a special de-sludging-type bowl that will greatly increase running time of these separators between cleanup.

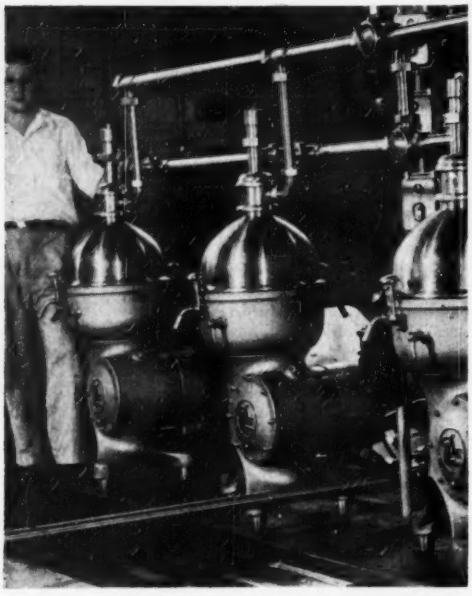
Design changes recently effected in the bowl of "air-tight" separators make possible efficient separation of cream from milk at 40 deg. F. In addition to economies in fuel, refrigeration and labor, there is less need for auxiliary equipment—heaters, coolers and piping—and the viscosity of the resulting cream is said to be especially high.

Where surplus skim milk is available, recovery of casein becomes an economical process by use of a continuous, solid bowl unit (Type IC1). Within the temperature range of 106 to 110 deg. F. and at a pH of 4.2, a granular casein is precipitated that can be centrifugally recovered at less than 60 percent moisture.

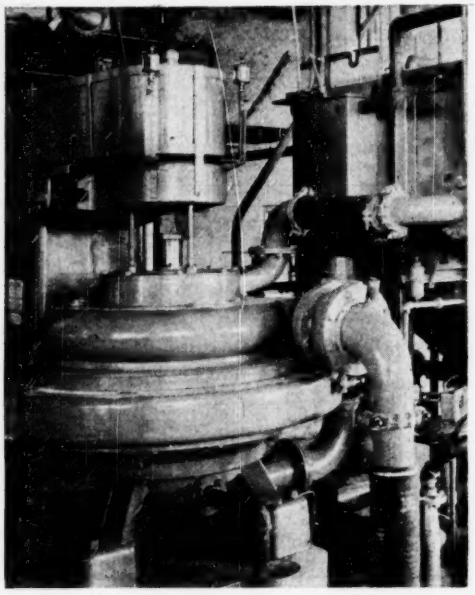
Fish Reduction and Stickwater

Centrifuges have played an important part in the development of the byproduct fish industry (Fig. 15). Here the raw materials—menhaden, herring, sardine, pilchard, and tuna, both whole fish and offal—are cooked to denature their protein content and centrifuged (Type IC1 unit) to separate the fish meal from the oil-water emulsion. The fish meal is dried and sold as feed or fertilizer.

STRIKING IMPROVEMENTS ATTAINED: In dairying, wet milling of starch . . .



MILK is now separated cold, giving cream of superior body. Process results in savings of steam and refrigeration. Investment in previously required heating and cooling equipment is eliminated.



STARCH is separated from gluten continuously with these recirculating centrifuges that have made starch tables obsolete. Quality and purity of products have been greatly improved.

The oil-water mixture is reheated to 200 deg. F. and again centrifuged to separate the two phases. A separated oil of satisfactory purity for the market and a substantially oil-free stickwater are discharged continuously at feed rates up to 3,000 gal. per hr. from nozzle-discharge disk centrifuges (Types IB2).

In a recently developed process[3], the stickwater from the the above separation is acidulated to pH 4.5 to coagulate the colloidal proteins and enzymes which are then removed by means of a clarifying solid-bowl machine (Type IC1). Temperature of the stickwater is increased to 200 deg. F. and the oil, liberated from the coagulated colloidal solids, is separated by centrifuging with a nozzle-discharge machine (Type IB2). The stickwater is then concentrated to approximately 50 percent solids and used for enriching poultry and livestock feeds (Fig. 16).

In the Meat Industry

An outstanding new application is the continuous reclamation of profitable products from tankhouse waste by a speedy, mechanized, controllable method using centrifuges.[4] In this process, material discharged from a wet rendering tank is immediately separated into tankage, grease, and high quality tankwater which does not foul tubes of the evaporators used to concentrate it.

The entire cycle requires only 20 min. The tankage has a low moisture and oil content, and better physical properties for further drying than pressed tankage. Also, loss of available protein (20 to 40 percent is lost by putrefaction in press-separated tankage) is eliminated.

In this process (Fig. 17), tankage is rendered and primary grease is removed in the customary manner. Remaining tankage is blown into the slush box where large bones are removed, then a special pump takes it to a mill which thoroughly disintegrates the material. Further breakdown is accomplished in a steam-jacketed kettle, where the material, held at over 180 deg. F., is vigorously agitated.

The hot tankage is then fed to solid bowl centrifuges (Type IC1), which continuously discharge meat meal to the dryer. The remaining liquid is discharged into a receiving tank, from which it flows over a shaker screen for removal of floating particles.

The liquid is heated to 205 deg. F., in a re-heat tank, and fed to nozzle-discharge centrifuges (Type IB2) for separation of grease. The tankwater is then concentrated for recovery of amino acids and vitamins.

Vegetable and Animal Oil Refining

Approximately 90 percent of the vegetable oils produced in this country are centrifugally refined. Two methods are in general use: Caustic, and carbonate refining. In the first method, crude oil is treated with a sodium hydroxide solution, and this is followed by continuous mixing, heating, and centrifugal separation of the soapstock that has been formed. The separated oil is water-washed several times, then centrifuged and vacuum dried.

In carbonate refining, the oil is treated with a soda ash solution, with vacuum evaporation following to set the gums. The mixture is again treated with soda ash solution to plasticize the gums, then centrifugally separated.

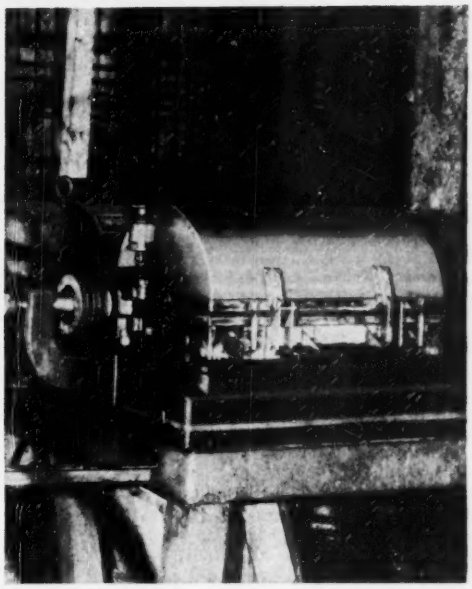
The oil is given a light caustic treatment and again centrifuged. Yield from this method is said to be almost equal to the actual neutral oil content of the crude.

Both tubular- and disk-bowl (Types IA and IB) separators are used for caustic refining and for water-washing. Standard disk-bowl machines (Type IB1) are used for the other treatments.

In the recently developed alkali rendering process for production of top quality lard[5], centrifuges play an important role (Fig. 18). High speed (25,000 rpm.) Super-

. . . prepackaging fresh vegetables, and making of meat byproducts

SPINACH quality is augmented by quick removal of excess moisture that adheres to leaves during washing. Washed product is bagged and packed in bowl, then centrifuged for 2 min.



MEAT PACKING tankage meal with improved qualities resulted when horizontal solid-bowl machines made continuous processing feasible. Likewise, fish meal is derived from stickwater.

Centrifuges (Type 1A) are used for the primary separation of fat from the liquid phase containing proteinaceous material originally present in the pig fat. After the initial separation, two or three hot water washes, followed by centrifugal separation (with Type 1A machines), give a lard free from most of the undesirable properties found in conventionally rendered lard.

Replaces Tables in Starch Manufacture

In the manufacture of corn starch, separation of the starch from gluten, fiber and soluble components is accomplished by specially designed nozzle-discharge centrifuges that are capable of handling solids in suspension and washing them as they are concentrated (Fig. 5).

At the new Corn Products Refining Co. plant, Corpus Christi, Tex.*, the separation is accomplished in two passes of three centrifuges each (Fig. 19). The first pass produces a high-protein gluten and an impure starch fraction. This starch fraction is fed to the second pass, which produces a low-protein gluten fraction (that is re-cycled to the first pass) and a pure starch ready for final washing.

Gluten from the first pass is concentrated by passing through disk-bowl dewatering centrifuges (Types IB2), then going to drum filters and finally to flash dryers for production of stock feed.

The special (Merco) recycling type of centrifuge is also used to concentrate starch from wheat, rice, sweet and white potatoes. And tests are being conducted on root starches.

Fruit and Vegetable Juices

Centrifugals are extensively employed for complete, partial, and selective clarification of fruit juices.

An interesting development in selective clarification of fruit juices is illustrated in the preparation of pineapple juice. Previous practice had been to clarify a part of the juice with tubular-bowl separators, then blend this with unclarified juice to obtain a finished product of approximately 16 to 18 percent solids. Frequent shutdowns for cleaning the tubular separators necessitated the use of a large number of machines.

In several recent installations, externally controlled valve-discharge (Type IB3) machines are used. These continuously discharge a juice with 16 to 18 percent pulp, and a 75 percent pulp slurry containing the undesirable fruit specks, coarse fiber, and other foreign materials. Also used for this operation is the Merco recycling nozzle-discharge machine. Both types operate for long periods without shutdowns.

In the production of concentrated tomato juice for freezing, an improved product is made by separating the serum from the pulp, concentrating the serum in a vacuum pan, and adding back a sufficient quantity of pulp to produce the desired color and texture in the reconstituted product. This separation of serum from pulp is best performed by valve-discharge centrifuges (Type IB3).

Experimental batches of catchup that are said to have a superior flavor have also been made by separating and cooking the serum, then blending it back with pulp.

Citrus Oil Production

Recovery of oil from orange, lemon and grapefruit peel is another field in which centrifuges are employed. Formerly, tubular bowl machines were used, but in recent years the trend has been to nozzle discharge disk centrifuges (Type IB2).

Reamed peel, after removal of juice, is pressed in water to squeeze out the oil. The emulsion is screened to remove coarse pulp and then centrifuged. In order to insure maximum oil recovery, some water is discharged with the oil. This is later removed by re-centrifuging or polishing in

tubular machines (Types IA). These separators yield, from one spout, a clear purified oil, while from the second spout water is discharged that can be reused for removing oil from the peel.

Yeast Separation

In the recovery and concentrating of nutritional yeast[7], continuously-operated nozzle-discharge disk centrifuges of special design are almost universally used. The yeast culture is fed to the separator at up to 6,000 gal. per hr. Discharged "cream" or concentrated yeast, containing 15 to 17 percent solids, is then dried to 3 to 6 percent moisture, usually on drum dryers.

Clarification of yeast after use in fermenting tanks in breweries is carried out in basket (Type IIA) centrifuges turning at 1,500 rpm. These machines remove solids and trub that coagulate in the wort, hop resins and dead yeast cells. Capacities of centrifuges used for this purpose are approximately 6,000 gal. per hr.

Soya Bean Protein

In extracting proteins from ground and de-oiled soya bean, the meal is first soaked in an alkaline solution, then centrifuged to separate the solids from the liquid containing the protein. Valve-discharge machines (Type IB3) are used. Solids are emitted through the intermittently operated valves while the liquid is discharged as a clarified effluent. The effluent is chemically treated to precipitate proteins which are concentrated in nozzle-discharge separators (Type IB2). The concentrated paste is then ready for final processing.

Essential in MSG Manufacture

Centrifuges are employed at three different stages in the manufacture of monosodium glutamate from Steffens filtrate procured from beet sugar refineries.[8] In the process, the filtrate is carbonated with lime kiln gases, the precipitated calcium carbonate is removed, and the liquid concentrated to about 65 percent solids. This concentrate is filtered, then run into steel tanks, along with a 50 percent caustic soda solution, where the pyrrolidine is hydrolyzed into glutamic acid. After cooling the hydrolysate is acidified with HCl and concentrated in a forced-circulation evaporator. The mineral salts are removed by a Bird continuous centrifugal, and the filtered solution is adjusted to the isoelectric point of glutamic acid.

Following crystallization by cooling, the slurry is discharged to a Dorr thickener. The underflow from the thickener is passed through a battery of Western States centrifugals (Type IIA) which recover the crude glutamic acid crystals. This material is refined, made into a solution of monosodium glutamate with caustic soda, concentrated, and crystallized. The slurry is discharged from the crystallizers, centrifuged (Type IIA), and dried in a rotary drum dryer.

In the Brewing Industry

In Europe, centrifuges are widely used for separation of sludge from hot wort and for clarification of beer.[9]

Machines of the empty-bowl type, with three filtering cylinders and operating at speeds of 3,800 to 4,500 rpm., are used for wort clarification. Some of the machines have sludge chambers holding 65 liters. Their capacities range from 70 to 85 bbl. per hr.

Advantages claimed here are: Greater biological purity of the wort, saving of time and floor space, saving in labor as compared to cleaning and washing sludge filters and cloths, and a conserving of wort extract. Latter saving amounts to 2 to 3 percent of the sludge removed by surface coolers and hot wort tanks.

For beer clarification, hermetically sealed, disk-bowl machines are used. Speed is about 6,000 rpm. and capacity 19 bbl. per hr. Up to 900 bbl. can be clarified before it becomes necessary to clean the bowl.

Other Applications

Indicative of their great versatility is the part played by centrifuges in the manufacture of chewing gum. Here, the crude chicle is heated to 300 deg. F. and centrifuged to remove foreign matter. In order to maintain this temperature during the separation, steam coils are built into the jackets of the machines.

Another recent application of considerable importance is in the manufacture of ripened cream cheese. In this process, centrifuges are rapidly replacing the "bag" method for removal of whey prior to packaging.

This process[10] employs a modified separator with two outlets—one for whey and one for the concentrated curd and fat mixture. The unit is also equipped with a special scraper to move the high viscosity curd-fat mixture. The cream cheese is fed to the separator at a temperature of approximately 160 deg. F., and the resulting product is not aerated in the process.

In the manufacture of Advokaat, a rich egg nog made from fresh egg yolks, cane sugar and Genever gin, centrifuges have solved a knotty problem. The fresh yolks contain a natural oil that must be removed from the Advokaat to insure a perfectly uniform final product.

Formerly this was accomplished by allowing the product to stand until the oil rose to the top, from where it was decanted. Now, the product is passed through industrial separators that discharge the oil from one spout and the creamy Advokaat from the other, ready to be bottled immediately.

In the production of olive oil, over-ripe fruit is first washed with warm water, then disintegrated, and finally crushed between heavy stone wheels to rupture the fruit's cells. The crushed material is pressed to extract juice and oil, and the liquid is pumped to settling tanks, where the juice drops to the bottom. Oil is removed from the top of the tank, washed with warm water, and centrifuged at 15,000 rpm. (Type IA units).

The juice is withdrawn from the settling tanks and centrifuged to reclaim emulsified oil. This oil is mixed with warm water and centrifuged, combined with the previously separated oil, and aged to remove bitterness before packaging.

In making French fried potatoes for freezing, and in making potato chips, the frying fat is continuously centrifuged to remove particles that would otherwise carbonize.

All told, centrifuges have strikingly demonstrated their ability to replace slower, less efficient methods of filtering or settling. They have eliminated bottle-necks and aided materially in the change-over from batch to continuous processing. And, by their speedy separation of perishable products, quality deterioration has been greatly lessened.

Likely, many more knotty problems now confronting operators in the food industry, will be solved within the next few years by the use of these versatile machines.

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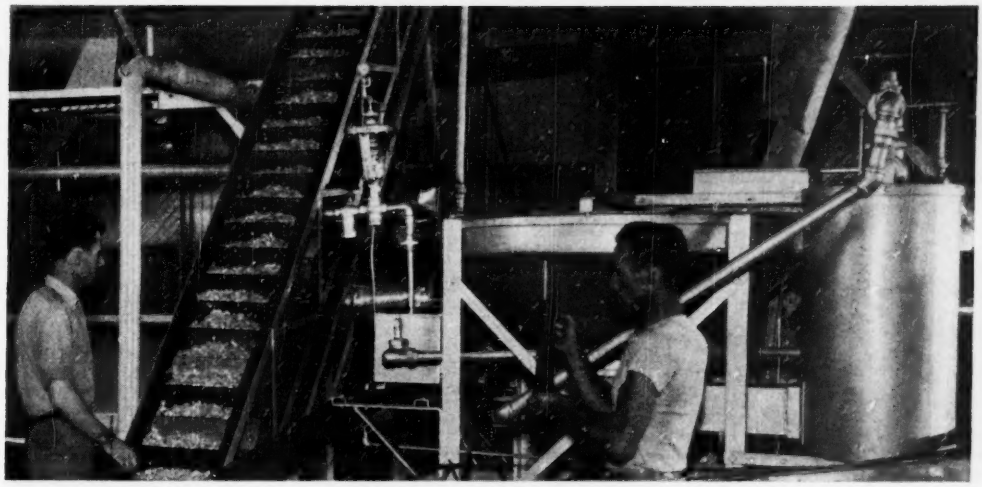


QUALITY AND ECONOMY. After beans (left) are elevated and pass through blancher, they go to quality grader (right) that removes skins and trash. This installation cut inspection force by 50 percent.

Process Line Revamping Pays Off In

PLUS-PERFORMANCE

And These Were the "Pluses" Delivered When Frozen Lima Packer Revised His Technics:

Power consumption . . . Reduced 25%
Inspection labor . . . . . Halved
Product waste . . . . . Minimized
Bean quality . . . . . Notably improved
Shrinkage factor . . . . . $20 an hr. saved
Bacterial count . . . . . Down one-fourth

WILLIAM J. HART
Chief Technologist,
John H. Dulany & Son, Inc., Fruitland, Md.

Marked economies in labor and improved product quality have resulted from modernization of the lima bean freezing line at the plant of John H. Dulany & Son, Inc., Exmore, Va., where the beans are handled automatically and continuously from viner shed to sealed packages.

In fact, further savings have been achieved: The job is now done with approximately 25 percent less refrigeration, and up to $20 per hour is saved through reducing former losses in product desiccation. Credited is the use of chilled water to transport beans from inspection belts to the freezer.

And the substitution of water for mechanical methods of conveying throughout much of the process has reduced product waste, cut maintenance cost, and lowered bacterial counts. All of the water used for processing is chlorinated to a residual of 2.5 ppm. by means of a Wallace & Tiernan automatic in-plant system.

How the Line Functions

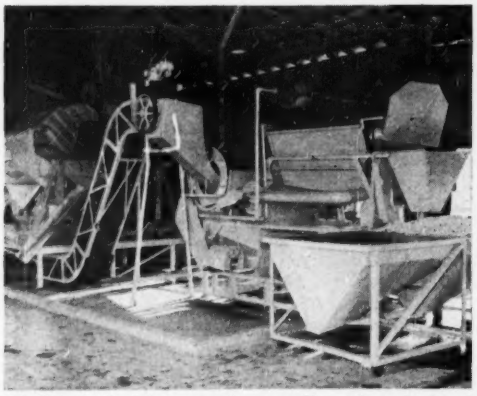
Let us now take a closer look at the processing operations: When the proper stage of maturity has been reached, the lima bean vines are harvested and the beans removed and processed as quickly as possible. All produce harvested within a 15-mile radius is taken to the freezing plant to be vined. That grown beyond this radius is vined on portable equipment set up in the fields. Then, these beans are iced and immediately hauled to Exmore for freezing.

After vining, the beans pass through a sieve-type cleaner that removes pods and leaves, next go through a flotation washer, which removes pod juice and small particles, and then go into hopper trucks. Beans are weighed in these trucks, then pumped through a 4-in. flume from the viner shed to the freezing plant.

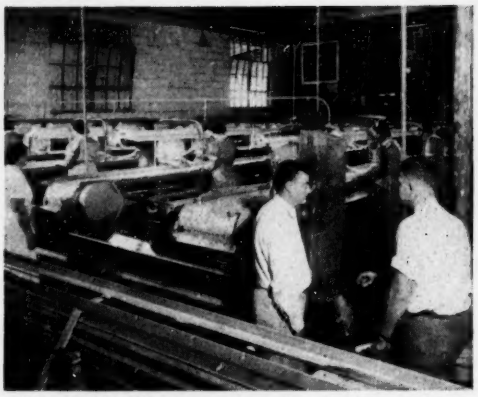
Here, the beans are dewatered in a rod washer and enter a brine-type quality grader, where the white and over-mature green beans are separated by specific gravity, from the immature green ones. The latter are blanched in a rotary hot-water unit at 210 deg. F., cooled, next are flumed to a second quality grader that removes loose skins and trash, then are flumed to four belts for final inspection.

Use of this second grader has made it possible to operate each of the inspection belts with an average of 8 women—approximately 16 were needed before its installation.

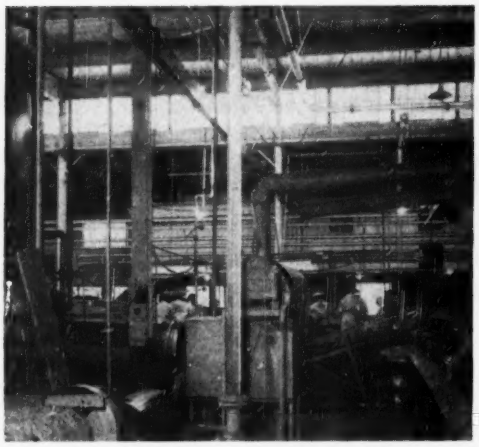
SALIENT BENEFITS ARE HIGHLIGHTED BY CAMERA



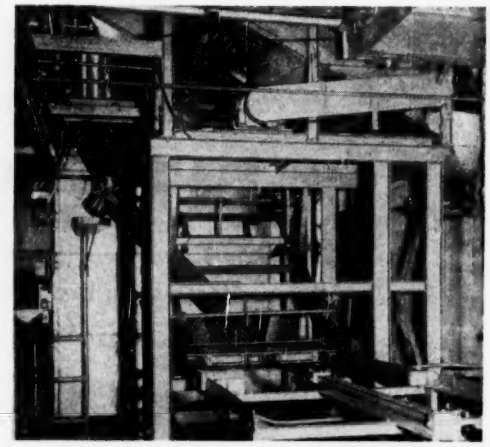
VINING at plant improves bean quality. Seen (l. to r.) viner, cleaner, washer, and portable hopper trucks.



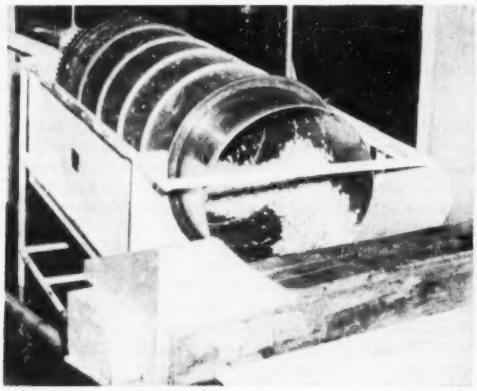
FINAL INSPECTION is performed with 50 percent less labor since second quality grader was installed.



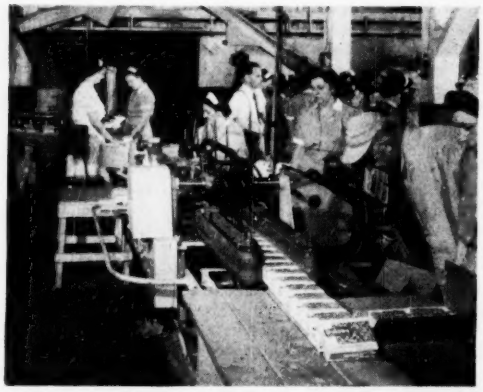
HYDRO-CONVEYOR, using glass tubing, cools beans while transporting them from inspection belts to freezer.



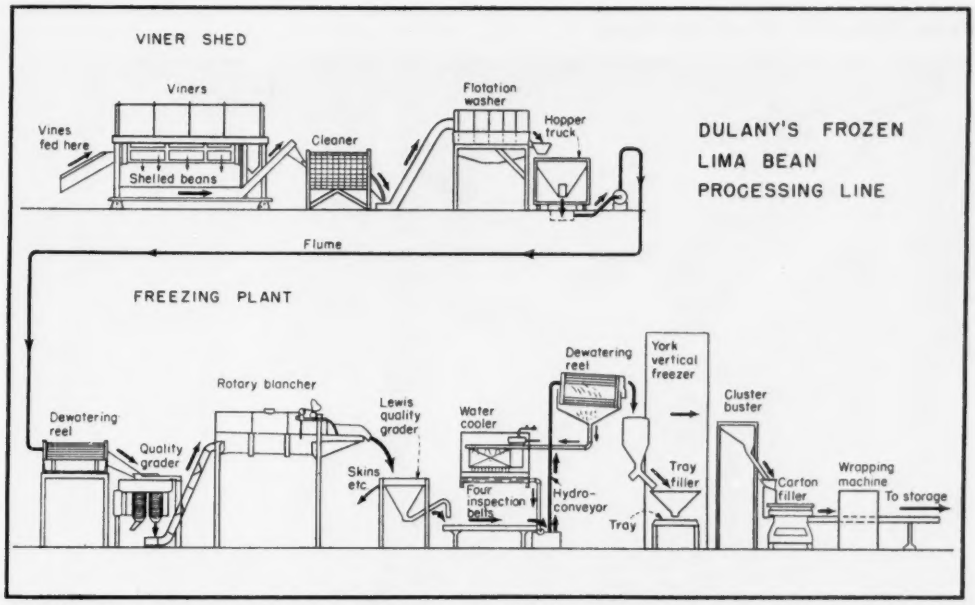
TRAY (center) is filled by gravity as air cylinder first pushes it under hopper, then into freezer.



DEWATERING REEL receives beans from hydro-conveyor and discharges them into freezing-tray filler.



FROZEN BEANS are automatically filled into 1-lb. packages, which are then over-wrapped, sealed and cased.

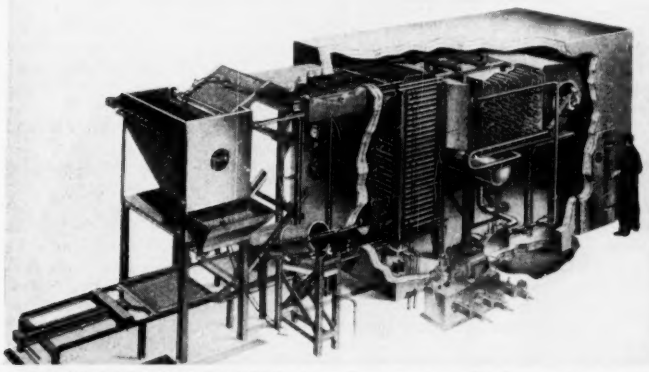


FLOWSHEET shows how beans are vined, cleaned and washed in viner shed, and then flumed to freezing plant. This arrangement assures continuous, automatic flow—from vines to wrapped cartons.

Following inspection, beans are flumed to a Sinclair-Scott hydro-conveyor that elevates and carries them to a rod-type dewatering reel at the freezer. By use of cool water (34 deg. F.) in this fluming and conveying operation, temperature of the beans is lowered from approximately 70 deg. to 40 deg. F. In effect, this has upped output of the freezing unit by more than 25 percent.

The water is cooled by a High-K York refrigerating unit. This is a surface type cooler which uses low-pressure ammonia on the inside of horizontal tubes. The water flows over the outer surfaces. Since the ammonia in this cooler boils at approximately 30 deg. F., as compared to -40 deg. or lower in the freezing unit, effieiency of the compressors operating on it is almost 300 percent greater than those operating on the freezer. This represents a considerable saving in power cost.

Another advantage of this water handling method is the much lower bacterial count of the beans—estimated to have been cut 25 percent—brought about by the free chlorine in the water.



CUT-AWAY OF YORK FREEZER shows how trays are filled, enter bottom of unit, move upward through blast freezer, are ejected from top, and automatically dumped. Frozen beans drop into hopper, where rubber-knobbed roller breaks them apart, then go to carton filler. Trays return to track for refilling.

From the dewatering reel at the freezer, beans are discharged into the tray-filling hopper of the York Continuous Vertical Freezer. Beans are frozen in wire-bottom trays that hold approximately 75 lb. each. These trays are filled by gravity (see accompanying photo) as they are pushed under the hopper by an air cylinder.

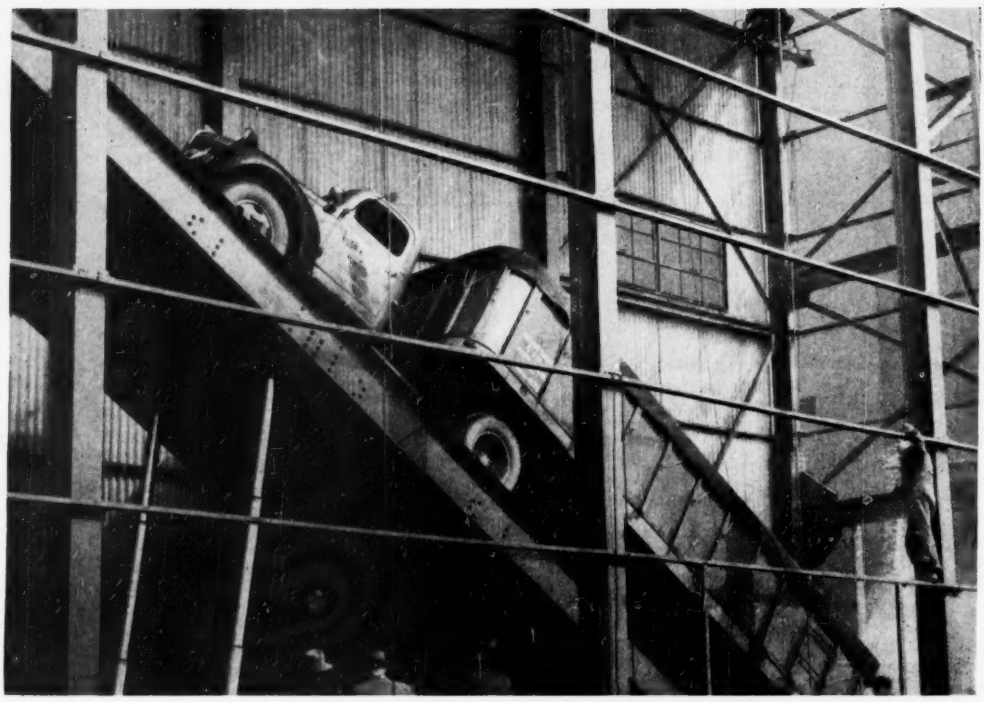
Frozen, Then Packaged

Operation of the freezing unit is entirely automatic. Trays are filled at predetermined intervals and move immediately into the bottom of the unit. Then they travel upward during the freezing process and are ejected from the top when the beans are solidly frozen. Contents of the ejected tray are automatically emptied into a hopper, where the beans are broken apart by a rubber-toothed roller and fall onto a belt that conveys them to the hopper of the FMC automatic carton filling machine.

During passage on the belt, the beans travel under a magnetic separator. Take-offs are provided along this belt for filling the 30-lb. bulk cartons and also the 2½ lb. packages.

The 1-lb. size packages are automatically closed, check-weighed, overwrapped with a special printed waxed paper, and packed into master cases. Cases are sealed and moved by tow-tractor trucks to refrigerated storage, from which they are later shipped to distributors.

Head High, Tail Down on Ramp



Gravity Does the Unloading

Entire truck-trailer units are tilted, at Illinois elevator, to dump incoming bulk materials onto conveyor, which carries them to hopper for storage

TILTING the whole motor vehicle, truck or tractor-trailer, to unload—instead of raising the vehicle dump body by means of its own hoist—is the outstanding feature of a truck grain unloader installed early in 1950 by the Illinois Grain Terminals Co., cooperative affiliate of the Illinois Agricultural Assn. at its Irondale Elevator in Chicago.

Previously, all in and out grain shipments had to be made by barge or rail. The new unloader has opened up a new area of supply within a 75 to 90-mile radius of Chicago. Grains may be moved directly from the farms to the elevator by motor truck equipment, covering a market that Irondale was heretofore unable to reach.

In actual practice, most of the loads are carried by tractor-trailers, instead of straight trucks, because of the larger load carrying capacity of the former. Accordingly, the new unloader was made 50 ft. long for ample accommodation. This is 5 ft. longer than the vehicle length allowed by Illinois motor vehicle laws.

Combined With Scale

Made by the Air-O-Flex Equipment Co., Minneapolis, the new unloader is combined with a scale, all installed in a steel-framed building 35 ft. high. The building is enclosed with asbestos siding and is served by separate in and out paved roadways to speed up the truck unloading operations.

The entire installation cost $80,000, including the building, entrance and exit roads, truck unloader, scale, scale house, underground 1,000-bu. receiving bin, a conveyor to move the grain to storage hoppers, and the necessary operating controls and safety devices. The scale and unloader are capable of weighing and tilting tractor-trailers carrying loads of 1,000 bu. The conveyor taking the grain from the receiving bin has a handling capacity of 10,000 bu. per hour. Its belt is 2 ft. wide.

One of the unusual features of the Irondale elevator is the fact that all grain is weighed before it is dumped. The scale house, which opens onto the truck unloader scale platform, houses the controls for the unloader and the scale operations. All weights are certified by the company's unloader manager, the representative of the shipper (in this case the trucker), and of course the official weighman of the Board of Trade.

The scale house also contains nec-

essary equipment for the sampling of grain and the safety controls for the unloading operation. The electrical control for the conveyor that takes the grain away from the receiving bin, and that for the elevator or leg taking the grain from the end of the receiving bin conveyor and raising it to the storage bins, are both located in the scale house. It is thus impossible to operate the conveyor or the leg without going into the scale house.

Lights in the scale house indicate whether either the conveyor, or the leg, is or is not in operation. The leg, however, can be stopped (but not started) by a pushbutton control on the storage bin floor.

All grain received by truck at the elevator is handled by mechanical means. There is no need for shovelers. The only manual labor needed in the entire time from "in" to "out", is for trimming on the cars, barges or boats on which the grain is shipped out.

Equipment in Action

In operation, the loaded tractor-trailer enters the truck unloader building under its own power and is stopped on the 50-ft.-long by 10-ft.-wide unloading platform, which is combined with a Buffalo weighing scale installed in an underground pit below the platform. This pit also houses the platform tilting mechanism.

The gross weight of the vehicle and its load is then taken. Next, a notched plate, forming a part of one end of the tilting platform, is raised by means of a small hydraulic cylinder to form two wheel chocks for the rear wheels of the truck or semi-trailer.

Whatever distance there is between the rear wheels of the semi-trailer and the wheel chocks is taken up by the driver backing up the unit so that the rear trailer tires press directly against the chocks. The tractor and semi-trailer brakes are then applied and the tilting platform is ready to be raised. Neither the tractor front or rear wheels are chained to the platform, the weight of the tractor-trailer, with or without its load, being sufficient to prevent side slipping when the platform is elevated.

Next, the hinged tilting platform is raised by means of the two large telescoping hydraulic cylinders in the pit under the platform. The rear of the semi-trailer is nearest the hinge. Thus, when the tailgate is opened, the grain flows out by gravity and through the steel-grated open top of the receiving bin, which is located in the floor inside the unloader building just ahead of, and adjacent to, the hinged end of the tilting platform.

If all of the grain does not flow out of the semi-trailer body at the angle of inclination to which the platform is first raised, it is tilted still higher to a maximum 35-deg. angle. This is adequate to unload the longest trailer with the slowest flowing grain. Included among the grains unloaded are oats, barley, corn, and soybeans.

Simultaneously with, or shortly after, the tilting of the platform and the opening of the trailer tailgate, the receiving bin conveyor may be started, together with the leg elevator, from the top of which the grain may be chuted into one or more of 17 different bins.

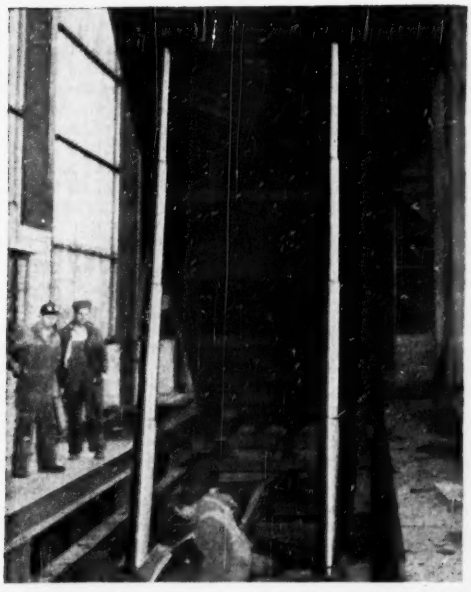
When the carrier has been unloaded, the tilting platform is lowered to its horizontal position and the receiving bin conveyor and the leg elevator shut off. The tractor and trailer is then weighed empty and the difference between this weight and the loaded weight is certified as the weight of the grain delivered. Finally, the driver rolls his truck off the platform and out through the special exit road to the public highway without any backing while on company property.

Smaller Units Available

Other similar truck unloaders, although not as large as that at Irondale, are in service in Chicago at the Keystone Elevator, the Norris Grain Co., and the Cargo Grain Co. Darling & Co., also in Chicago, uses a similar truck and trailer unloader at its rendering plant for quick disposition of animal bones picked up from butchers,

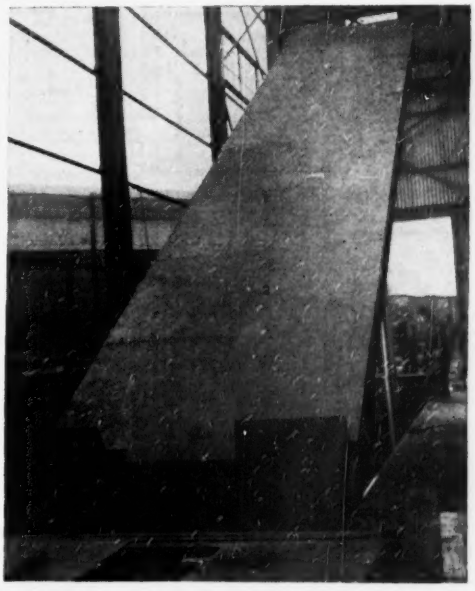
(*Turn to page* 182)

Cylinders Lift Platform



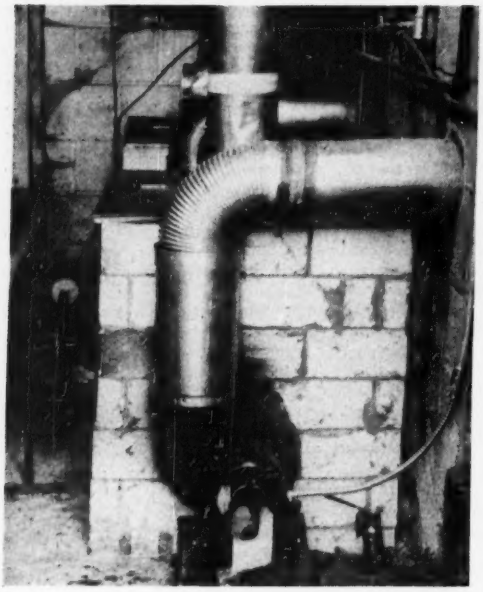
UNDERSIDE shows two telescoping hydraulic cylinders that raise and lower ramp.

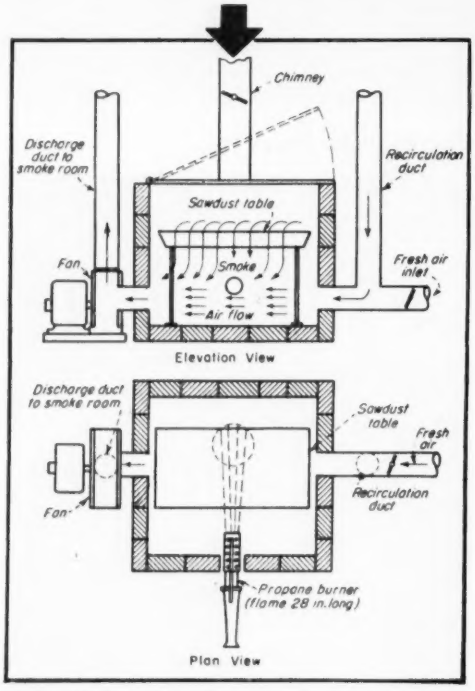
Chocks Hold Truck



TOPSIDE has sturdy chocks for wheels at business end of extra long platform.

Propane-Fired Oven and How It Works





IN OPERATION OF OVEN, propane flame jet enters below metal sawdust table. Its heat smolders sawdust, creating the smoke. Fans circulate the smoke and heated fresh air, the latter providing sufficient oxygen for combustion of gas and sawdust.

Improved Meat Smoking Reported With Propane

This gas supplies more Btu.'s than other fuels. Operator finds it easier to control product shrinkage

PAUL MELCHERT
Industrial Consultant, Gas-Heat, Inc., Portland, Ore.

Propane gas, used as a heating medium for a 50-50 mixture of maple and alder sawdust, is providing a more efficient, automatically regulated means of smoking meats at Evergreen Packing Co., Orchard, Wash. And because propane results in increased moisture vapor, shrinkage due to moisture losses can be controlled better.

Shrinkage of hams in smokehouses using propane for fuel is 25 percent less than where wood is used.

Addition of sawdust to the ovens is the only manual operation. Automatic controls maintain a uniform temperature with less than ½ deg. F. variation in the forced air convection system.

Compared to other fuels, the combustion characteristics of propane not only bring more moisture vapor but also a higher ultimate CO_2 content. Products may be processed at any desired moisture content. This permits control of shrinkage due to excessive moisture loss.

Propane's greater efficiency lies in the fact that 1 cu. ft. of the gas develops 2,550 Btu., while the same quantity of natural gas develops 1,000-1,100 Btu., manufactured gas 500 Btu.

Operation at Evergreen

There are two ovens and two smoke rooms at the Evergreen plant. Smoke and heated air are circulated through these rooms at 600 cfm., with a temperature drop of 10 deg. F. Air temperatures of 150 deg. F. are used for hams, 135 deg. F. for bacon. Former are smoked 8 to 10 hr., latter not over 9 hr. Each room is 4 x 8 x 10 ft. high, and has a 1½-ton capacity. Walls and doors are stripped with light asbestos sheeting to prevent air leakage.

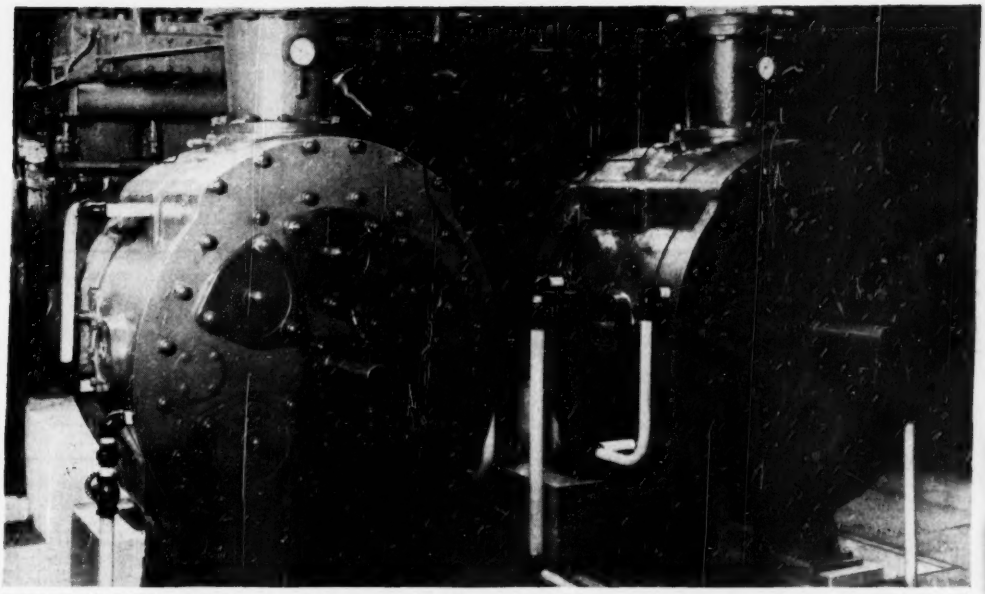
The two heating ovens can develop a capacity of 200,000 Btu. per hr. Normal use averages 100,000 Btu. per hr. Ham requires 140 Btu. per cu. ft. of house volume.

Operation of the oven (see diagram) is as follows: A 28-in. propane flame enters below the metal sawdust table. Its heat smolders the sawdust, creating the smoke. Fans circulate the smoke and heated air through the smoke rooms, then back through the ovens. Fresh air, in controlled amounts, is drawn into the oven and provides sufficient oxygen for combustion of gas and sawdust.

To facilitate leak detection, the propane is "odorized." On combustion, a sweetish scent is produced.

TABLE—COMBUSTION PRODUCTS OF SELECTED FUELS. Note higher moisture vapor and CO_2 content for propane gas.

	CO_2 %	H_2O Vapor %	N_2 %	Ultimate CO_2 %
Propane gas	3.0	4.2	18.8	13.65
Manufactured gas	0.53	1.25	4.19	11.30
Natural gas	1.30	2.29	9.26	12.30



MODERN VACUUM PUMPS—they find many applications in food plants. These two are reciprocating units.

Vacuum-Pump Figuring Made Easy

Simple arithmetic method gives time required to evacuate receivers. Graph indicates proper motor. Formula shortcuts pipe sizing

TYLER G. HICKS
Assistant Editor, "Power"

The simple arithmetic method for planning and checking vacuum pump systems presented here is one that most food plant men will be able to understand and use with ease. It applies to reciprocating and rotating pumps, whether they be used with your filters, vacuum pans, evaporators, canning equipment or bottling machines.

As shown in Fig. 1, the usual vacuum system consists of the pump and a receiver to which are connected pipes from vacuum outlets and pump intake. Pump takes air at low pressure from the receiver and discharges it at "high" pressure to the atmosphere. Although referred to as air, the substance handled may be a mixture of air and gases, according to the process being served.

Calculations for figuring vacuum

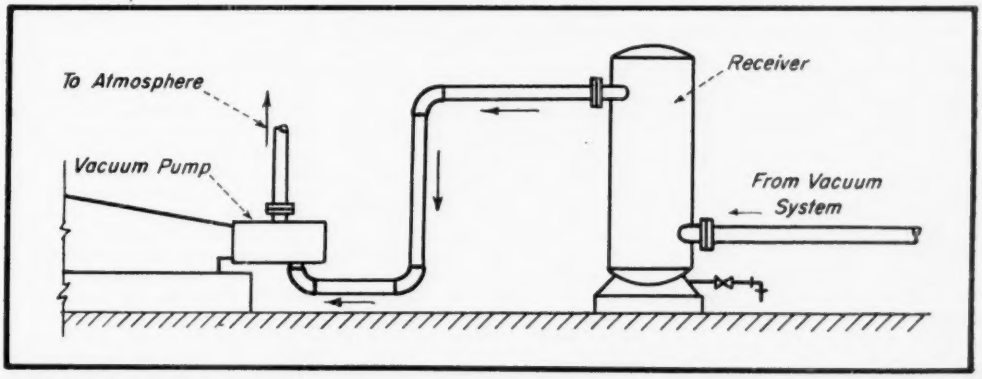


FIG. 1—USUAL VACUUM SYSTEM consists of the pump and a receiver, with the air flow as indicated.

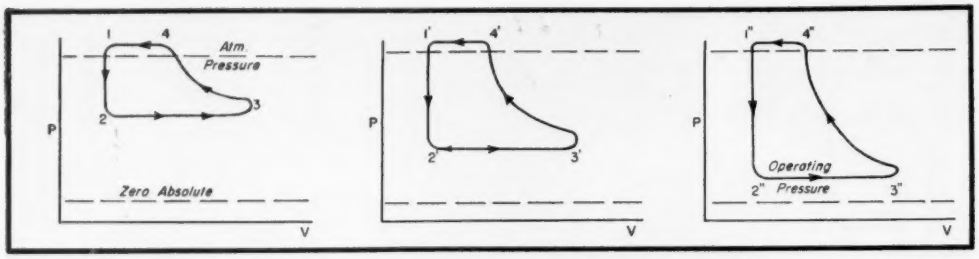


FIG. 2—INDICATOR CARDS for typical vacuum pump show how it reduces pressure in the receiver. At left is early stage; at center intermediate stage; and at right pump has pulled down to operating pressure.

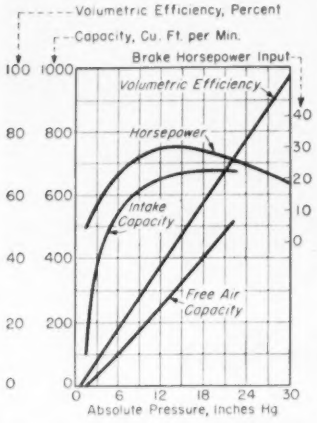


FIG. 3—CHARACTERISTIC CURVES for a typical reciprocating vacuum pump.

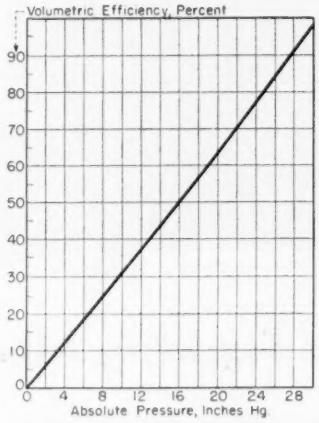


FIG. 4—VOLUMETRIC EFFICIENCY curve for pump analyzed in this article. Referred to atmospheric conditions.

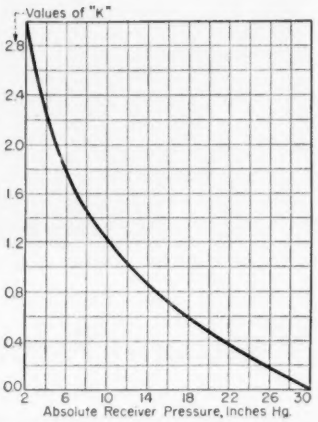


FIG. 5—VALUES OF "K" for vacuum pump equation are picked from this curve.

pump systems involve three factors: (1) Time required to evacuate a receiver of given capacity, (2) power necessary to drive the pump, and (3) intake and discharge pipe sizes. Before going into these, a study of pump operations and characteristics should prove helpful.

Pump Operation

Vacuum pump operation is similar to that of the more familiar air compressor, as illustrated by typical indicator cards for the former. Referring to Fig. 2: At left, with the receiver full of air at atmospheric pressure, the piston starts its suction stroke at 1 and reduces receiver pressure to 2. It continues to the end of the stroke, 3, where compression begins. At 4, discharge of air at slightly greater than atmospheric pressure starts, ending at 1. Cards at center and right show the gradual reduction of receiver pressure to the normal operating pressure of the system.

The number of strokes required to reach system operating pressure depends on receiver capacity, pump volumetric efficiency, and piston displacement. Study of these cards shows that a vacuum pump is actually a compressor which operates in the lower pressure ranges.

Performance characteristics for a typical reciprocating vacuum pump are plotted in Fig. 3. Horsepower input increases as suction pressure increases, to a maximum value somewhere in the range of 15 to 1 in. Hg. abs. Beyond this point, required power input decreases. Hence, if a motor were chosen for the horsepower required at a final receiver pressure of 6 in. Hg., it would be overloaded before the receiver pressure was 25 in. Hg.

Vacuum pump intake capacity decreases with suction pressure until the so-called "dead-end" limit is reached. At this point, pump volumetric efficiency and output are zero.

Volumetric efficiency decreases from nearly 100 percent at atmospheric pressure to zero at the dead-end limit. As a result, accurate analysis of pump operation requires calculus.

But for the usual planning problems met in food plants, an approximate analysis calling for only simple arithmetic (and a little more pencil work) will yield sufficiently accurate results.

Time Required to Evacuate Receiver

To calculate the first of the three factors in vacuum pump systems—time required to evacuate a receiver of given capacity—follow the example below:

Problem: A vacuum system with a 200-cu. ft. receiver is to operate at 2.5 in. Hg. abs. when the barometer is 29.8 in. Hg. Determine the time required to evacuate the receiver when a single-stage vacuum pump with a displacement of 60 cfm. is used. The pump is rated to dead-end at 29.0 in. of vacuum when the barometer is 30.0 in. Hg., and pump volumetric efficiency follows the curve in Fig. 4. This curve shows atmospheric volumetric efficiency.

Solution: The pump will have to operate to within 2.5 in. of the barometer, or a vacuum of 29.8 minus 2.5 equals 27.3 in. Hg. By selecting

arbitrary absolute pressures between 29.8 and 2.5 in. Hg., and determining the amount of air removed from the receiver between these successive pressure values, the time required for removal of this air can be found by use of the average volumetric efficiency from Fig. 4.

Use Handy Table

Thus, set up a table similar to the one accompanying this article. In Column A list pressure values between 29.8 and 2.5 in. Hg. Pressure reductions of 3 in. Hg. have been assumed for all except the last few values, where smaller reductions have been taken to improve accuracy. Enter in Col. B the ratio of absolute pressure in the receiver to atmospheric pressure.

Then, the amount of air remaining in the receiver (Col. C), measured at atmospheric conditions, is the product of receiver volume and the ratio of pressures. This product is simply an application of the gas laws, with receiver temperature assumed constant. The assumption is valid because, although air temperature varies during pumping down, the overall effect is one of fixed temperature.

Quantities of air removed from the receiver during each pressure reduction are next determined by successive subtractions of the values in Col. C, and they are entered in Col. D.

Since volumetric efficiency varies during each pressure reduction, an average value must be used. This value can be found from the efficiency curve in Fig. 4 for this pump, or from the characteristic curve of the actual pump to be used. Thus, average volumetric efficiency during the presure reduction from 29.8 to 26.8 in. Hg. is 91 percent at $(29.8 + 26.8)/2 = 28.3$ in. Hg. These percentages are entered as decimals in Col. E.

The quantity of free air that the pump can handle during any reduction in pressure is numerically equal to the product of average volumetric efficiency and piston displacement. For the first reduction it is $0.91 \times 60 = 54.6$ cfm. Since Col. D shows that 20.2 cu. ft. are removed, the time required is (cu. ft. removed)/(cylinder capacity in cu. ft. per min.) $= 20.2/54.6 = 0.370$ min.

Similar calculations for all the pressure reductions are made and added up. Total time required to evacuate the receiver in this problem is about 9 min., as shown in the table.

This result is suitable for all usual design purposes because it closely approaches the actual time required. The errors involved are so slight as to be negligible because leakage into food plant vacuum systems often equals 100 percent of the volume handled.

Motor Graph

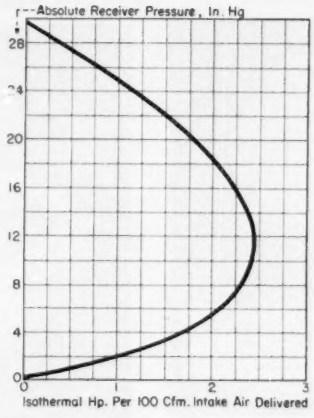


FIG. 6—USE ISOTHERMAL HORSEPOWER curve (theoretical) for approximating power requirements for a given vacuum pump.

Where only a first approximation of evacuation time is needed, the tabular calculations are more accurate than necessary and take too much time. Many first approximations can be obtained quickly by using basic laws governing vacuum pump operations and Fig. 5.

The relation $T = KV/D$, in which T is pump-down time in min., K is a constant from Fig. 5, V is receiver volume in cu. ft., and D is piston displacement in cfm., is based on an assumed volumetric efficiency for a typical vacuum pump. Use it as follows:

Problem: Find the proper displacement for a vacuum pump to evacuate a 350-cu. ft. receiver to an absolute pressure of 10 in. Hg. in 2 min.

Solution: Enter Fig. 5 at 10 in. Hg. receiver pressure and read a value of 1.21 for K. Then, $D = KV/T = 1.21 (350)/2 = 212$ cfm.

Problem: Find time needed for a 32-cfm. vacuum pump to produce an absolute pressure of 15 in. Hg. in a 175-cu. ft. receiver.

Solution: From Fig. 5, K is 0.8, and $T = 0.8(175)/32 = 4.4$ min.

The curve for K is suitable for the ranges given, but is not accurate where lower absolute pressures are necesary or where the pump departs markedly from assumed conditions. For such cases, the tabular method of analysis should be used.

Power Needed to Drive Pump

Power necessary to drive the pump, the second factor in figuring vacuum pump systems, is usually specified by pump manufacturers. However, when the manufacturer's data are unavailable, an estimate of the power needed to drive the pump can be obtained from Fig. 6.

The portion of this curve below the peak load at about 11 in. Hg. is really academic, since you remember the motor should be chosen so that it won't be overloaded at pressures around the hump of the curve. Note that this curve is based on air intake conditions, whereas all other air quantities in this article have been based on free air at atmospheric conditions. Customary practice among manufacturers has isothermal horsepower expressed as in Fig. 6.

Determining Pipe Sizes

Suction and discharge pipe sizes—the third factor—can be determined by using standard pressure-loss equations, charts or tables. Most commonly used equation is that developed by Harris and altered by others to $\Delta p = Q^2F/P$, where Δp is pressure loss in psi. per 100 ft. of pipe, Q is flow rate in cfm. of free air, P is initial pressure at pipe entrance in psia., F is $0.04185/d^{5.31}$, and d is pipe diameter in inches.

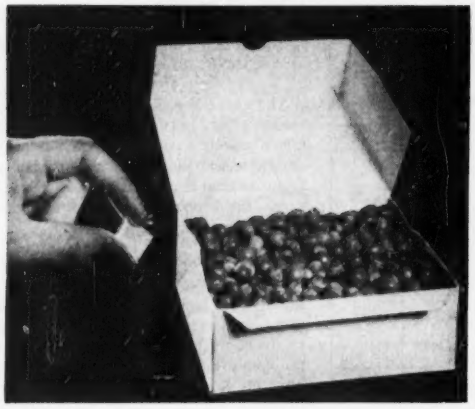
Extreme care is necessary in sizing suction and discharge piping to prevent excessive friction losses which might overload the vacuum pump.

Here's Pattern for Your Own Pump Figuring

TABLE for Determining Receiver Evacuation Time. To Calculate, Just Follow Running Reference in Text.

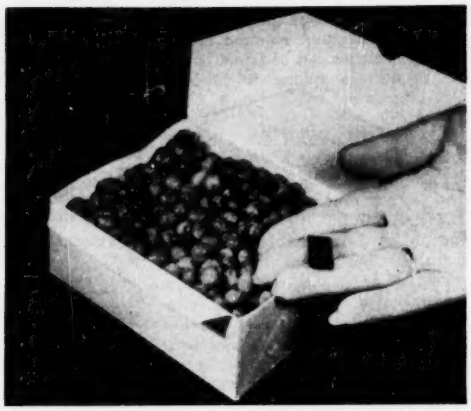
(A) →	(B) →	(C) →		(D) →	(E) →	(F) →	(G)
		Cu. Ft. of Free Air					
Abs. Press. in Receiver, In. Hg.	P./P.	In Receiver	Removed	Aver. Vol. Eff., Fig. 2	Free Air Capacity, Cfm	Evacuation Time, Min.
29.8	1.00	200.0	0.0	.....	.....	.....
26.8	0.899	179.8	20.2	0.91	54.6	0.370
23.8	0.798	159.6	20.2	0.81	48.6	0.415
20.8	0.698	139.6	20.0	0.72	43.2	0.464
17.8	0.597	119.4	20.2	0.62	37.2	0.544
14.8	0.496	99.2	20.2	0.52	31.2	0.648
11.8	0.396	79.2	20.0	0.43	25.8	0.776
8.8	0.295	59.0	20.2	0.33	19.8	1.020
5.8	0.195	39.0	20.0	0.23	13.8	1.450
3.8	0.128	25.6	13.4	0.14	8.4	1.596
2.8	0.094	18.8	6.8	0.09	5.4	1.260
2.5	0.084	16.8	2.0	0.07	4.2	0.476
					Total time required =	9.019 min.

NO CHANGE: All's well



COMPOUND in tiny oxygen-permeable transparent envelope is still colorless—meaning this food has never thawed.

VERY DARK: Watch out!



INDICATOR from another box has passed through brown hues to tell-tale black, showing faulty freezer storage.

Did It Thaw? Gel Will Tell

Simple indicator, combining oxidizing enzyme and ascorbic acid, will spot any temperature rise, thus warning of possible damage to frozen foods

PAUL E. RAMSTAD and FRANCES E. VOLZ

Associate Professor of Biochemistry and Research Associate, respectively, School of Nutrition, Cornell University, Ithaca, N. Y.

Maintenance of high quality in frozen foods requires, of course, that they be kept frozen during storage and distribution.

Thawing and refreezing may have a number of deleterious effects. Texture, flavor, and color changes harmful to quality may occur. There's also the possibility of a health hazard resulting from exposure to warm temperatures.

Bacterial Multiplication

Frozen foods are not sterile. It is not necessary for them to be sterile because microbial growth is very effectively inhibited by low storage temperatures. However, when such products are exposed to thawing temperatures, the bacteria present can multiply rapidly, often more rapidly than in the original unfrozen product, because the freezing process may have damaged tissues in a manner that makes them more readily attacked by bacteria.

Even frozen foods that have been subjected to rather severe heat treatment in the course of processing are unlikely to be sterile. This is because sterilization was not complete, or because recontamination occurred during subsequent processing and packaging.

Precooked frozen foods are especially likely to be dangerous if thawed and refrozen. Such foods are not usually sufficiently acid to inhibit growth of pathogens, as is the case for most fruits. They are not subjected to the sterilizing effect of thorough cooking after thawing, since they are warmed only to serving temperature. Therefore, if they have excessively high bacterial counts as a consequence of long exposure to thawing conditions prior to preparation this is still further increased during preparation for the table.

The Task of Proving It

It is often difficult to prove whether or not a frozen product has been thawed and refrozen. If there is reasonable indication that this has occurred, it is still difficult to ascertain when it took place (or who was at fault) and the degree of damage that might be expected.

These difficulties might be eliminated by placing, in each frozen food package, a thawing indicator that will meet certain requirements. Such an indicator should be easily read, show the degree of exposure to thawing temperatures, have no effect on the food, and be economical to use. Another desirable attribute would be that the

(*Turn to page* 182)

EFFECT of Ascorbic Acid Concentration on Rate-of-Color Development in Thawing Indicator Packets Held at 40 Deg. F.

	Ascorbic Acid Concentration (%)		
Holding time	**0**	**.05**	**.10**
10 min.	Traces of amber	Colorless	Colorless
1 hr.	Light brown	Colorless	Colorless
3½ hr.	Brown	Traces of amber	Colorless
6 hr.	Brown	Brown edges	Traces of amber
12 hr.	Black	Brown	Light brown
25 hr.	...	Black	Very dark brown
36 hr.	...	...	Black

We Think . . .

▪ Food Processing Profits May Be Used as Tax Propaganda

Food processors may be in for another unjustified attack by the federal government. The Federal Trade Commission is keeping tabs on profit trends in our industry. The purpose is to provide Congressmen with hot air with which to inflate a political football. Then this football will be kicked around to focus attention on the alleged need for stiff excess profits taxes.

If FTC executes this maneuver, it will be one of the dirtiest tricks played in Washington in many months. Sure, food processing profits have been improving this year. They gained a little in the second quarter, and the trend has been up since Korea. But the rise is slight and is a much needed change, not an unjustified trend toward excess profits.

In 1939 the average net profit per sales dollar for grocery manufacturers was 4.6 cents—certainly not a high margin. Yet by 1948 the profit was down to 3 cents, and last year only 2.9 cents. Based upon a limited number of reports, the current profit margin is placed at about 3 cents.

So if FTC wants profit figures to frighten the public, it had better look elsewhere. The danger is that dollar profits rather than the profit rate will be used for propaganda. In an industry doing better than $33 billion in sales a year, the total profit from even the measly 3 cent rate would amount to nearly a billion dollars. This sounds big, but when spread over the great food processing industry it is peanuts—too small even to finance the research, new product development and modernization needed to best serve the interests of consumers and the nation.

To counteract any unfair excess profits propaganda based on food processors' earnings, leading food companies would be wise to give a little publicity to their meager profits so that the public will know the score. Food consumers should be made to realize that higher food prices are not caused by processors' profits, but by government support of agricultural commodity prices, by high labor costs, high freight rates and the rising cost of supplies—over which processors have no control.

A stiff excess profits tax is almost certain to be passed for political reasons. Yet it is a bad thing for industry in general because it puts a premium on wasteful and inefficient practices, encourages business men to meet unwise demands on the part of organized labor and reduces investment in progress. Besides, no legislators have yet succeeded in devising a practical excess profits tax system.

And such a tax may be particularly harmful to food processors if the profit level of recent years is taken as a fair return. The tax will then deny the industry the chance to achieve a sound profit level.

▪ Investigation of Chemicals in Foods Gives Wrong Impression

One of the most experienced news interpreters of Washington, in a report on the early phase of the Delaney Committee investigation, says:

"Food industry should pay attention to probe of chemicals in food now going on in the House by Delaney Committee . . . The record is rapidly becoming a general indictment of food processors on the grounds of carelessness. Almost no attempt has been made to defend the reputation of food makers."

We would be much concerned if we felt that such an interpretation of the situation was going to remain permanently in the minds of the public, the press or the Congressmen. We know that it has been in the minds of some of the committee staff, which appears to reflect the chairman's disappointment that his "select committee" has not produced a more conspicuous and more favorable newspaper reaction.

We are inclined to think that this disappointment results primarily from the failure to realize that there is very little substance back of the claim that the food industry has neglected its public responsibility.

We know very definitely that the industry has not neglected this responsibility. Nor has it been opposed to a public discussion of ways and means by which a few irresponsible enterprises may be quickly identified and curbed.

We think that the major associations of the food business will in due time present fairly and adequately the attitude of the clear thinking leadership along these lines. And it will be much better to have such presentations follow the statements of government spokesmen and zealous nutritionists. Then the committee may be assisted by competent experts from industry on specific subjects previously brought before it.

▪ Here's a Chance to be Honored for Technical Achievement

"An award for food technology achievement to ——— Food Co., in recognition of its contribution to the advancement of the industry and profession of food technology, made possible through a broader participation by the food technologist in the affairs of the food processing industry."

That inscription on the Food Industries Award plaque succinctly explains the high purpose of this biennial award.

The value of the award to a recipient is self-evident. It distinguishes the company as a leader in its chosen field, and as a contributor to progress in the greatest industry of them all. It raises the standing of the winner and the professional prestige of the individuals who developed the process. It makes employees proud of the firm and pleased to be associated with it. And it improves the standing of the company in the community.

We would like to see every food company which has developed a process of which it is proud join the competition for the 1951 FI Award. It will be presented at the next annual meeting of the Institute of Food Technologists. And the deadline for entries is January 1.

Anyone can enter a process in the competition. Just write to the Editor of Food Industries, 330 West 42d St., New

York 18, N. Y., who is acting as secretary of the Award Jury appointed by the IFT and headed by Dr. S. C. Prescott. The material explaining the process may accompany the letter, or be submitted a little later.

The Award Jury will need, of course, a technical description of the process, an explanation of how it came to be developed, the steps by which it was developed, and information about its technical and economic successes.

The 1951 Award plaque would look good in your reception room. Go after it.

■ Civilian Defense is a New Job for Food Executives

Food plants are less subject to sabotage and the consequence of civil disorder or vandalism than are many other types of manufacturing establishments. Nevertheless, each food factory is now obliged to prepare for such contingencies.

Every plant manager should acquaint himself with protection measures. A splendid first course in planning is readily available in the 15c. booklet *Plans on Plant Protection,* published by the Munitions Board of the Department of Defense. It is an elementary, but very broad, treatise which plant managers can profitably peruse for an hour or two some evening.

Far more significant for food factories is the organization for better civilian defense. National Security Resources Board has prepared a 25c. document, *United States Civil Defense,* which is a very satisfactory primer on how to meet the emergency of an air raid, fire or civil disorder—even an atomic-bomb attack.

Company managements will do well to get both of these booklets from Superintendent of Documents, Government Printing Office, Washington 25, D. C.

State and local organizations will be set up, of course, to handle wartime emergencies. And these will provide training courses of value to selected factory personnel.

Excessive zeal will occasionally make these activities a bit of a nuisance. But somehow they must be fitted in. In some cases executives will want to provide meeting and training facilities in their factories and offices. In a few cases they will want key personnel who are well suited for positions of leadership to devote some of their skill and time to the community.

Here is a civic responsibility which should not be ignored.

■ Draft Policies Should Be Geared to Modern Concept of Defense

As the military rearmament program moves at a faster pace, the problem of loss of important men to the draft becomes increasingly acute. In known instances, draft boards have refused to defer a man even for as little as 30 days. One such case deserves mention:

A factory manager became seriously ill and was hospitalized, with the prospect of spending about four months on his back. The assistant factory manager, who was doing double duty while his superior was ill, was drafted shortly thereafter. The corporation endeavored to get a 30-day deferment, but without success. Yet no understudy for the assistant manager was available.

We have heard the arguments between Stuart Symington and General Hershey about deferments for specialized technical men. Both are doubtlessly correct. Yet it seems that a larger concept of national defense should underlie the decisions as to draft or deferment.

War today is nation against nation in contrast to the older concept of war as a clash between armed forces only. Draft policies should be set up on this larger concept.

■ Workers Should Be Made Aware of Their Hidden Wages

Labor agreements nowadays include many subjects beside direct wages. Perhaps most important, and least understood, is the magnitude and character of the "hidden payroll." Few plant workers realize that in many cases the cost, and the value to them, of indirect benefits is a very substantial part of the pay from the employer.

In a recent analysis made for the Chamber of Commerce, there has been developed a highly significant set of facts which deserve thoughtful study. Here are some of them: The hidden payroll for benefits, pensions, insurance, vacations and similar items averages $477 per year per worker, or 23.7 cents per hour. This was 16 percent of the business payroll last year.

These facts suggest the need for analysis of the hidden payroll in every company where the employees are getting benefits that do not show in take-home pay.

Then every worker should be made fully aware of his hidden benefits. This could well be carried to the point of indicating the amount of non-take-home income on a slip included in each pay envelope.

■ Ripening of Bananas Would Boost Impulse Buying

There was a time, if memory serves, when one could buy ripe bananas in grocery stores. That time seems to have slipped away unnoticed in the post-war years.

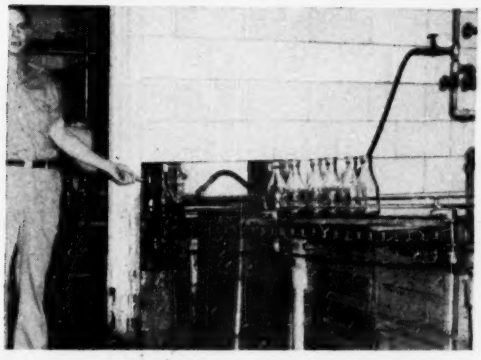
To be sure, one can purchase large half-ripe bananas in almost any grocery, but the ripening operation now must be done by the consumer. Since this requires from one to three days, the net result is to put an effective stopper on impulse purchases. The housewife must plan to serve bananas several days ahead of the intended date.

The ideal ripening of bananas is not as easily done in the home as in a properly equipped banana storage and ripening room. Anyone who has ever eaten correctly ripened bananas will testify to their superior quality. Bananas which ripen under the uncontrolled conditions of the store and the kitchen are not so good.

And we are not wholly convinced that the broadcast admonition to keep bananas out of the home refrigerator is an unmixed blessing. If it were added that properly ripened bananas can be kept in the refrigerator for a few days without losing quality or becoming over-ripe, we believe the consumers' interest would be better served.

Meanwhile, impulse purchases are curtailed.

PRACTICAL IDEAS

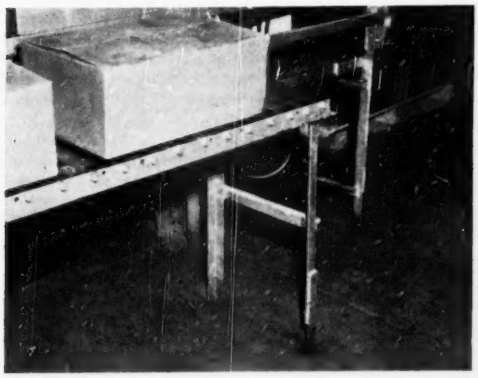


Spray Removes Heat From Bottles

A simply installed cold-water spray device will avoid heating up of milk as it is filled into bottles coming direct from the washer.

In the St. Petersburg Creamery, Petersburg, Ohio, bottles coming from the washer are quite hot. As they travel along the conveyor from washer to filler, they pass a 3-ft. perforated section of pipe (see photo) attached to the plant cold-water lines by a short section of hose.

Streams of cold water emitted from the perforations play on the centers of the bottles, and thus cool them before they reach the filler.—*Phil Lance, 2015 N. 8th St., Philadelphia.*



Correct That Wobble and Teeter

Work tables, chairs, conveyors and other production line equipment having metal legs, can be readily stabilized by simply welding extensions on the bottom of the legs (as illustrated).

Many food plant floors are sloped for drainage. Others, not sloped, are uneven at best. There are several ways to remedy the wobbling and teetering of multiple-leg equipment. Sawing off legs that are too long is one method, but this changes height. Wedging under a short leg is another way, but this procedure is usually temporary and seldom results in a satisfactory job.

Here is the way it is done in one food plant: Tables, conveyors, or processing equipment in question are blocked up and leveled to the correct height.

To any legs not resting on the floor, pieces of angle iron are attached, held in place by grip pliers, and welded. All legs then have correct length and wobbling will not occur unless the equipment is moved.

When relocation is necessary, if the legs are too long they can be cut with the torch. Extensions can then be added until the equipment is secure and the height correct at the new location.

Moreover, metal work chairs can be raised or lowered by this method to meet the comfort needs of employees.

$25 EXTRA FOR BEST ITEM

You are invited to submit Practical Ideas. You will be paid at regular rates when your item is printed and if it is judged best for the month you will get an additional payment of $25.

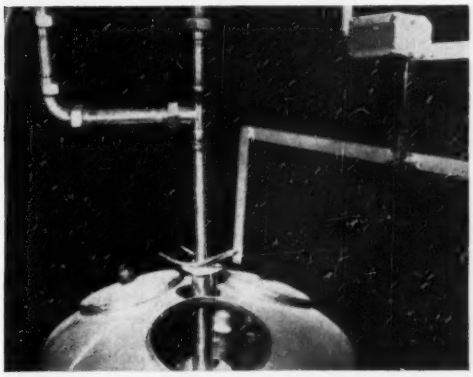
Selection of the best contributed item will be made by a group of 200 readers each month, and the item title and author's name will be cited (see below).

Practical Ideas may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. They may concern factory, laboratory, warehouse, or power-plant operations in the food industry. Ideas on management, maintenance, and trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit these ideas. The text will be edited and sketches converted to finished drawings.

Send your items to: Practical Ideas Editor, FOOD INDUSTRIES, 330 W. 42nd St., New York 18, N. Y.

OCTOBER PRACTICAL IDEA voted best was "Good Safety Rules Mean Less Mishaps." This piece was based on an item in "Let's Talk About Your Job," an employee booklet of Maxwell House Coffee Div., General Foods Corp.



Simple Float Controls Liquid Flow

This plant fabricated liquid-control valve arrangement has proved highly dependable for regulating the flow of

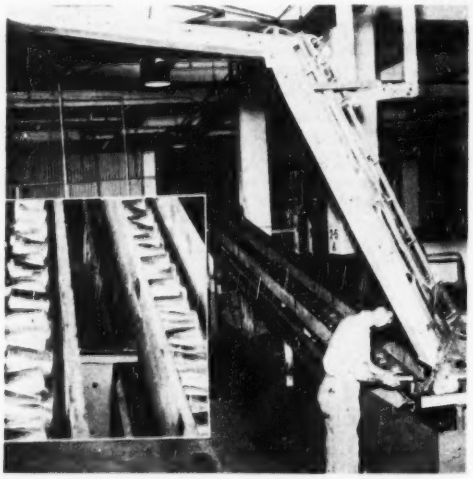
syrup at Taylor Reed Co., Glenbrook, Conn. And it will work with other liquid foods.

The ½ cu. ft. float is set in the tank which supplies the filling machine spouts. It comprises a stainless steel cylinder to which is welded a stainless steel tube. The tube serves as a sleeve over a blind extension of the filling line from the storage tank. This sleeve-on-anchored-pipe arrangement keeps the float centered.

As the sleeve rises, a collar that is welded to it (photo) lifts the forked end of a pivoted lever. A counterweight on the lever arm causes the fork to follow the collar down as the level of the syrup in the filling tank is lowered.

When the syrup in this tank is at "low," the lever trips a solenoid control. Air is then admitted to a cylinder operating a valve on the storage tank, from which the syrup is delivered to the filling machine supply tank. And when the float reaches the "full" level, the circuit to the solenoid is opened. The air valve is thereby closed, air is released from the actuating cylinder, and the syrup valve is closed by strong spring tension.

If for any reason the compressed air system should fail, the syrup storage tank valve cannot be opened. Further since the valve can only be opened while current operates the solenoid, no syrup can leave the storage tank in the event of a power failure in the plant.—*Ivan C. Miller, Editorial Consultant.*



Cools Cans 90 Deg. in 5 Min.

Time and space required to cool cans of pineapples have been greatly reduced in the Hawaiin Pineapple Co., Honolulu, by a continuous cooler newly developed by company employees.

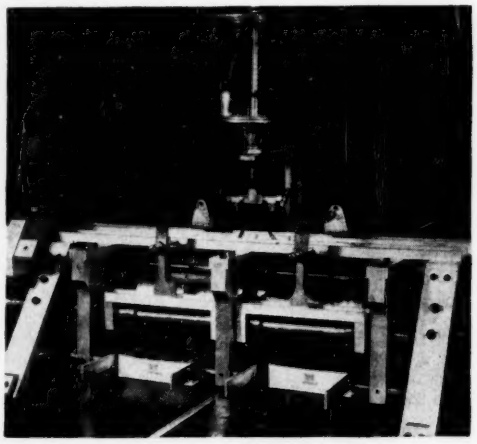
Hot cans of pineapples from the cooker travel from overhead runway (top) down to divider (lower right) then along twin-cleated rubber conveyor belts, against 32 gpm. streams of cold water. Can temperatures drop from 185 deg. F. to 95 deg. F. during the 5-min. ride on the bumpy 100-ft. conveyors. Inset photo indicates the motion imparted to the cans by the cleats.

Called the "Hula Cooler" this continuous unit eliminates an 18 - 48 hr. storage period and saves considerable space formerly required for cooling before labeling.

Motion of cans on conveyors is forward and upward on belts, but streams of water knock cans back onto the offset cleats. The 5-min. shake-up brings the innermost contents of the can to the edges for cooling. When cans reach the top they are ready for labeling.

The following employees helped develop the "Hula Cooler":

Kennosuke Sakai, John Abrey, Ray Linxwiler, Malcolm McFaull, Orlando Schoenber, James Yond, and George Burgess.



Lubricated Rolls Shape Fruit Packs

Installation of a lubricated rolling device has solved the problem of shaping 1-lb. batches of sticky, cubed, glace fruit in package trays at Lyons-Magnus, Inc., San Francisco.

Fiber trays are hand filled with fruit to a rough mound-shape. After check-weighing, the contents must be flattened level with tray sides in order to package. Formerly, four girls placed the cartons in protecting frames, then pressed down the fruit with lubricated metal plates. The new device eliminates this job.

Machine consists of two 6-in.-dia. brass rolls 4½-in. long mounted above the conveying belt just high enough to allow trays to pass under without damage. Final adjustment of space between rolls and belt is by spring tension (see top of machine in photo). The rolls are pivot-mounted (as shown in foreground).

As boxes pass under them, the rolls swing on the pivots, the amount of swing being controlled by the spring tension and by the weight of the rolls themselves. Adjustment is such that a minimum amount of fruit is pressed and there is no damage to the box. Rolls rotate in same direction as fruit travels, turning at speed slightly exceeding that of belt.

Lubrication of the rolls, necessary to prevent sticking of fruit, is provided by an alcoholic extract. From a cylindrical cup (top of photo), this lubricant is applied to the rolls a drop at a time. An extremely small amount of the extract is required.

Any fruit particles adhering to the rolls are removed by a scraper (back of machine). Accumulation from the scraper is removed manually as required. By proper adjustment of rolls and lubrication, this fruit pick-up is never enough to change net weight of package.

Machine is driven by a ¼ hp. single-phase motor. Rolls were made from 6-in. brass pipe. Frame of machine is made of hardened aluminum—*E. E. Jacobs, Production Manager, Lyons-Magnus, Inc., San Francisco.*

It's the Nash!

The ability of Nash Compressors to maintain original performance over long periods is no accident. Nash Compressors have but a single moving element, the Nash Rotor. This rotor is precision balanced for long bearing life, and it revolves in the pump casing without metallic contact. Internal lubrication, frequent cause of gas contamination, is not employed in a Nash. Yet, these simple pumps maintain 75 lbs. pressure in a single stage, and afford capacities to 6 million cu. ft. per day in a single compact structure.

Nash Compressors have no valves, gears, pistons, sliding vanes or other enemies of long life. Compression is secured by an entirely different principle of operation, which offers important advantages often the answer to gas handling problems difficult with ordinary equipment.

Nash Compressors are compact and save space. They run without vibration, and compression is without pulsation. Because there are no internal wearing parts, maintenance is low. Service is assured by a nation-wide network of Engineering Service offices. Write for bulletins now.

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature Automatically maintained.

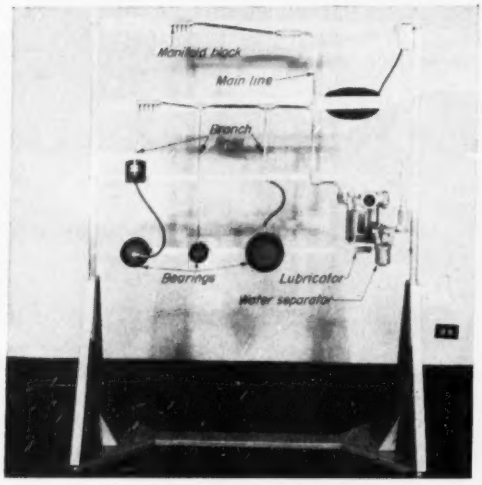
Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

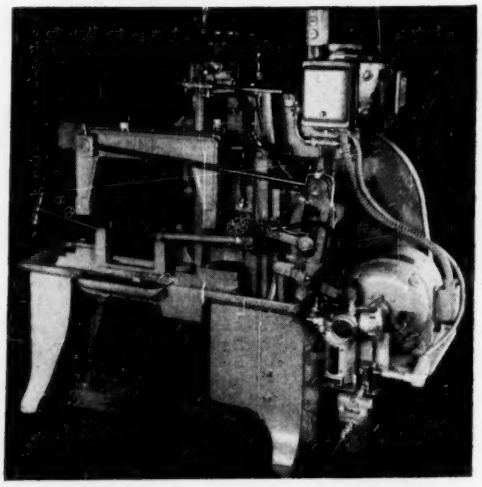
NASH ENGINEERING COMPANY

284 WILSON, SO. NORWALK, CONN.

Food Equipment News



Through use of this ingenious system...



...food machine lubrication is controlled

"Mist-Oiling" Is Continuous, Automatic A

Elimination of machine down-time for lubrication, prevention of product spoilage from lubricant drippage, economy in consumption, and prolonged bearing life are claimed for a new oiling method.

Known as "Oil Mist," it is a continuous, automatically controlled system that supplies air-borne oil through tubing to all types of machine bearings.

Heart of the system is the lubricator unit, which, by means of compressed air, atomizes the oil into a mist of microscopic particles that stay in suspension and can be conveyed through pipe lines. Lubricator is built in two designs—one for operation from the conventional plant air line; the other, with built-in air compressor, for use where air is not available.

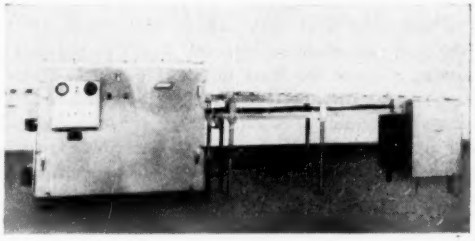
With its use, a fresh, constantly replenished supply of oil is present in the bearing whenever the machine being serviced is running. Further, it provides both coolant action and protection against dust and abrasives on bearing surfaces.

Cooling action arises from two conditions. One is application of just the right amount of oil, thus preventing "fluid friction." Second is passage through the bearing of the air which delivers the mist. Pressure of air carrying mist is slightly greater than atmospheric. Thus dust, abrasives or other harmful matter in the atmosphere are kept from entering.

Lubricator is attached to the base of machine to be served. In operation, dry clean air must be used. A new water separator, self-emptying without interruption, has been provided. This separator is stated to remove 98 to 99 percent of moisture from the air.

From the house line, air is passed through the water separator and is then run to the lubricator through a valve. The latter is operated by an electric solenoid that is controlled by the machine power switch.

Compressed air is provided by this valve all the time the machine is in operation, making the system continuous and automatic. Mist is conveyed through main lines to top of machine, where branch lines carry it to bearings being served. Hook-up is similar to low pressure steam installation.—*Alemite Div., Stewart-Warner Corp.*, 1826 *Diversey Pkwy. Chicago.*



Speedily Wax-Coats Cheeses B

Here is a new machine for coating cheeses, featuring a built-in melter that provides a continuous supply of wax at the rate of 50 lb. per hr. It was recently exhibited at the meeting of the Wisconsin Cheese Manufacturers Assn. in Milwaukee.

Production capacity is dependent upon the size and weight of cheese units being coated. For ½-lb. baby goudas, it coats at the rate of 2,000 lb. per hr.

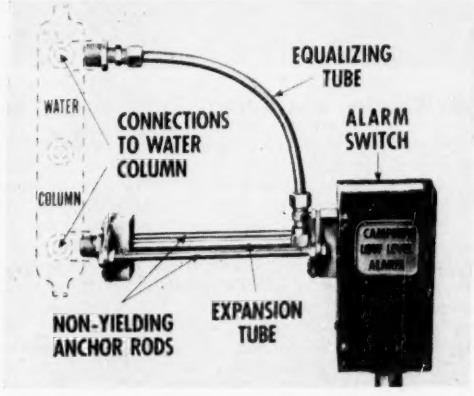
Unit is comprised of a feed table, coater, and cooling conveyor with drive pedestal. Operating level of assembly is approximately 3 ft. 6 in. above the floor.

Feed table is 3 ft. in length, 31 in. wide, and has a ½ in. mesh wire belt 16⅝ in. wide.

The coater, which is operated from a central control panel, is 62 in long, 44 in. wide, and 54 in. in overall height. It has a sanitary-type pump for circulating wax. Electric heaters (5,500w. total wattage) are thermostatically controlled. The jacketed holding tank contains special oil acting as the heat transfer medium. Insulating encasements are hinged to provide accessibility to machine. Coater employs a 1½ hp. motor.

Cooling conveyor has stainless-steel belt troughs. A stainless-steel tank is at delivery end of coater to provide a water curtain on conveyor for cooling wax coating. Conveyor has an overall width of 20 in. and may be either 4 or 8 ft. in length. It uses an 18 in. wide, white, endless Neoprene belt. Drive pedestal has over-all dimensions of 24 in. length and 31 in. width. A ½ hp. motor is used.

This coating unit was built for Sure-Seal Corp., formerly Utah Wax Refining Co., Salt Lake City, Utah. It is to be used in applying Cheez-Saver, Cheez-Kote, and Flex, new cheese protective coatings developed by Sure-Seal.—*J. W. Greer Co., Cambridge, Mass.*



Sounds Alert When Boiler's Low A

If the water level in your boiler reaches low, this highly sensitive device sounds an alarm.

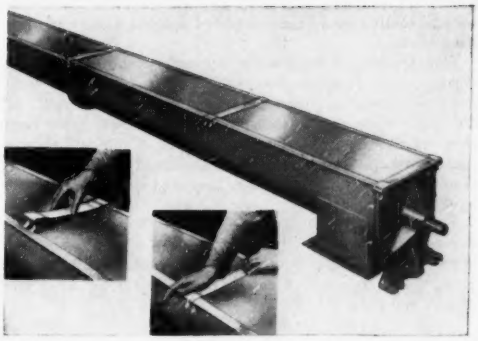
Unit consists of a simple ⅜ in. expansion tube with its inner end connected to the lower end of the water column on the boiler. Outer end is attached to the upper part of the water column by means of a 5/16 in. copper tubing. Therefore, the water rises and lowers above the expansion tube.

When the water reaches its low level, the increased heat expands the tube, which actuates a microswitch. The switch is a double-throw type with one throw connected to a buzzer, bell or howler. If extra safety is desired, the other throw may be connected to a solenoid valve in the fuel line for shutting off the boiler fuel.

A simple screw adjustment at the end of the expansion tube permits setting at any level. Switch works on .001 in. pin throw. The mechanical advantage on the lever is ten, so the switch throws on an expansion of .001 in. It will throw on and off on a temperature change of 5 deg F.

This device can be attached to any boiler water column (regardless of boiler size or of length of column) by use of the flexible tube.

Alarm switch is housed in a light metal box. It can be connected to a single 6v. dry cell battery.—*J. A. Campbell Co., 645 E. Wardlow Road, Long Beach 7, Calif.*



On-Off Conveyor Cover Clamps B

These snap-on clamps that fit over the screw conveyor cover are designed to eliminate the tedious, time-consuming removal of bolts. As seen, these straps can be placed at 5-ft. intervals to make a tight closure. Clamps are made of spring steel.—*Screw Conveyor Corp., Hammond, Ind.*

Improved Aseptic Canning C

Increased bacteria destruction in cans prior to filling, also decreased time loss in sealing, are reported for an improved process for sterilizing cans and sealing covers on canned products under aseptic conditions.

Canning under aseptic conditions consists of sterilizing liquid or semi-liquid products in high-temperature short-time tubular sterilizers—cooling the products to room temperature while still in a sterile state, and piping them into a sterile chamber in which there is a filler and sealing machine. Cans, sterilized beforehand, are transferred to this chamber through suitable valves, and are filled and sealed before reaching the open atmosphere, where they are labeled and made ready for shipment.

Latest technic incorporates a direct method of injecting steam into empty cans as they are sent to the sterilizing chamber by means of a rotary valve. Method purges cans of air content and increases rate of bacteria destruction in cans, eliminating entrance of germ-bearing air into the closed, sterile system.

In the new process, can covers are brought into the chamber with each can, and they are also sterilized by the steam process. Included is a method for clinching sterile covers to sterile cans inside the filling chamber. After

DON'T MISS THESE . . .

Conveyor needs no sideguards when new self-centering roll is used.....Page 92

Tray coating ups battery efficiency by guarding against corrosion and curbing abrasion.....Page 92

Angle disintegrator is easy to clean, since all contact surfaces are readily exposed.....Page 94

Lightness, efficiency mark new hand hoists. The ½-ton model weighs only 37 lb.....Page 96

AND WATCH FOR . . .

Electronic instrument for determining moisture content of several varieties of nuts.....January FI

Recently developed bottle elevator that enables more efficient use of floor space.....January FI

covers are in place, cans may be removed from the chamber and sealing operation completed without danger in open atmosphere.

This clinching method leads to greater canning efficiency, inasmuch as it eliminates the necessity of having complicated closing equipment inside the sterile chamber. In the past, when closing machinery adjustments have been required, complete resterilization of the filling and closing room was necessary after equipment adjustments. This resulted in considerable time loss and inconvenience to operators.

Process was developed by L. E. Clifcorn, Gordon T. Peterson, and John M. Boyd of the maker's research department, and a patent for the invention has been granted.—*Continental Can Co., Inc., 100 East 42nd St., New York City 17.*

Conveyor Needs No Sideguards A

With the use of a new device, it is stated no longer necessary to use sideguards to keep materials on a conveyor—a new self-centering roll does the job.

In food plants it's seen solving the problem of centering power belts, conveyor belts, or materials conveyed on roller tables.

Basis of the new roll is an ingenious application of a hitherto unused natural force. The principle of "planar action" was built into working models by E. T. Lorig, chief of the senior engineering staff of Carnegie-Illinois Steel Corp, subsidiary of United States Steel Corp.

Fundamentally the device is a slightly crowned roll cut transversely at the center. The two halves are fixed to rotate as a unit. The working surfaces of the two parts are approximately horizontal, while the axes are at an angle.

In this way, the planes, or lines of force, in both halves twist evenly toward the center in the direction of movement, conferring a self-centering action on any materials passing over the rolls. Sideguides are consequently unnecessary to keep materials on the conveyor.

Through experimentation, Lorig has found that a crown deviation of as little as 1/1,000 in. from the horizontal is sufficient in a split roll to create the planar action.

The rolls have been tested for such a diversity of applications as run-out tables, feed and guide rolls for electrolytic tinning, galvanizing and pickling lines, gravity conveyors, belt pulleys and conveyors and similar applications in the steel industry.

In the illustration above, W. H. Mursch, a Carnegie-Illinois Steel engineer who assisted in the model-making, demonstrates the self-centering action on a model run-out table. Here, from askew and off-center to straight, dead center, pencils line up automatically after passing over a series of only ten rolls.—*Office of Assistant to Chairman, United States Steel Corp, 71 Broadway, New York City 6.*

Tray Coating Ups Battery Efficiency B

Important savings, resulting from lower maintenance costs and achievement of maximum battery life, are reported for users of industrial vehicles through a new process which protects steel battery trays from corrosion.

During World War II, engineers began developing a process of corrosion-proofing to protect aluminum alloy battery compartments in military planes. This process not only used a new type of corrosion-resistant coating but also a new technic for applying it. The coating guards corrosion-sensitive aluminum alloy against action of acid, so experiments were tried on sheet steel coated with the paint.

These proved successful, and a number of steel trays, in production for heavy duty motive power batteries, were treated. After several years of use in the field, service reports indicated that this special coating does the job.

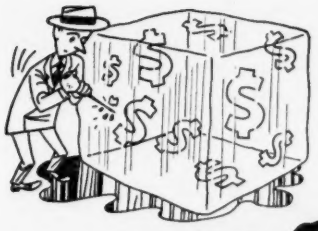
Maker also claims that if, under unusual circumstances, the surface is scraped exposing the bare steel, corrosion is limited to that area. This is due to the tight bond formed between coating and metal surface. As a result, corrosive action can't "wedge" its way between the two, but is confined to the damaged area.

The bond to the steel tray, as well as other factors within the coating, is said to enable it to withstand mechanical abuse from blows and abrasion without flaking off. Tests indicate that the new coating holds even when the blow is heavy enough to dent the steel.

Another characteristic claimed for this coating is high insulating quality. This protects steel trays from corrosion due to the leakage of current.—*Electric Storage Battery Co., Philadelphia 32.*

Want More Information?

It's free—and easy to get. Say for example, you want added details on the item marked "B" here on page 92. Simply flip to one of the special Reader Service postcards inside the front cover and circle 92B. Sign at the bottom and mail—no stamp needed. Then the extra information will be on its way to you.



Are hauling costs freezing your profits?

DODGE trucks are "Job-Rated" to save you plenty!

If your food profits have been nipped by old "Jack Cost," you can thaw them out by switching to a truck that fits your job!

And that, of course, will be a Dodge "*Job-Rated*" Truck!

Every part of your Dodge truck—from engine to rear axle—will be engineered and sized to haul your frozen foods at lowest cost per ton-mile. It will have an engine that's "*Job-Rated*" to give you plenty of power with top-notch economy.

You'll be surprised at the dimes and dollars you'll save with a truck that fits your loads and your roads.

Ask your Dodge dealer to show you how a Dodge "*Job-Rated*" truck can help you put the chill on distribution costs. See him today!

With all their extra value DODGE "Job-Rated" TRUCKS are priced with the lowest

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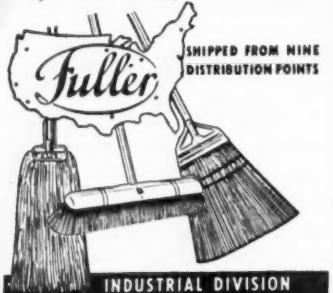
With Wear-Resistant FULLER FIBER BROOMS

You can reduce your daily cleaning costs with Fuller Fiber Brooms. Grueling wear-down tests by our own Research Department and, more important, the tests performed by our thousands of satisfied customers, prove conclusively that Fuller Fiber Brooms give better service for a longer period of time. We invite comparisons of the wearing qualities of the Fuller Fiber Broom with any other broom under any sweeping conditions. Test it yourself. Phone or write your nearest Fuller Industrial Representative today



SHIPPED FROM NINE DISTRIBUTION POINTS

INDUSTRIAL DIVISION
The FULLER BRUSH Co.
3640 MAIN STREET • HARTFORD 2, CONN.
In Canada: Fuller Brush Co., Ltd., Hamilton, Ont.

Large Flexible Tubing Is Tough, Non-Toxic A

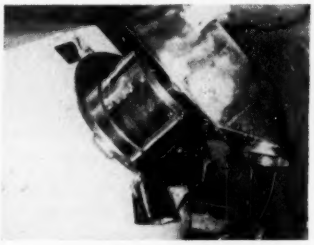
To meet a demand for a tough, translucent, non-toxic flexible hose for bulk handling of liquid food products, there is now offered Tygon flexible plastic tubing in sizes ranging from 1⅜ in. to 2½ in. o.d.

Its translucency permits visual inspection of flow, facilitates spotting of obstructions or foreign material, and simplifies cleaning procedures.

Ability of the tubing to resist chemical attack makes it suitable for handling almost all acids and alkalis.

Specially formulated for piping food products, it is reported to be completely non-toxic so that foods can be handled without danger of contamination or taste pick-up. It can be steam sterilized, with the smooth, nonporous surface easily flushing clean.

Tubing's "angleworm flexibility" simplifies installation, saving footage and time. Aim has been toughness and wear resistance, plus freedom from oxidation, to assure long life.—*The U. S. Stoneware Co., Akron, Ohio.*



Angle Disintegrator Is Easy to Clean B

Improved sanitation is reported with use of a new, compact, streamlined angle disintegrator.

All contact surfaces in this model can be completely exposed for cleaning, and take-down and assembly time is cut to a few seconds. Thus, contamination by bacteria or residue from previous processing is prevented, with a minimum of costly shutdown time.

The redesigned disintegrator still retains its unique dual discharge whereby lumps are separated from the primary product and pass by gravity through the hammers and out the secondary discharge. In many cases this means a combination size reduction and screening unit. Power consuming recycling is eliminated, and shorter through-put time obtained.

Constant, even flow of properly sized material with minimum temperature rise is secured with a 360-deg. screen. Belt drive gives flexibility to the rotor speeds, which range from 7,200 to 16,000 rpm. in the smaller units, from 3,600 to 7,200 rpm. in the larger.—*Rietz Mfg. Co., 441 Folsom St., San Francisco.*

New Device Controls A.C. Motor Speed C

A mechanical follow-up control unit has now been developed to make possible a fixed preset speed on a G.E. a.c. adjustable-speed motor.

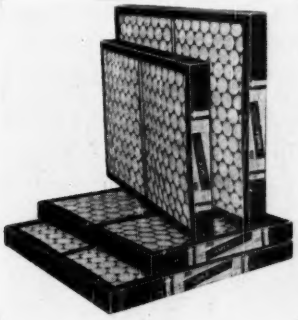
New device, according to company's engineers enables a predetermined speed to be set manually by a knob placed either directly on the motor or at the end of a flexible cable 10 or 15 ft. away. Adjustment can be made either while motor is at standstill or running.

Speed control of motor is obtained

by rotating brushes around the commutator. Since speed is a function of brush position, any device that automatically brings the brushes to an adjustable predetermined position on successive starts will establish preset speed operation. This is the purpose of the new preset speed device.

In operation, new mechanism actuates a pilot motor, which drives the brushes to a position corresponding to the setting of the speed adjustment knob. A stop or automatic slowdown returns brushes to lowest speed position without disturbing original setting. When motor is restarted, brushes again come back to preselected speed without any attention from operator. Accelerating time is dependent upon pilot motor speed.

Applications for motor with new device: On can-sealing machines, conveyor drives, mixers, and fan drives.—*General Electric, Schenectady, N. Y.*



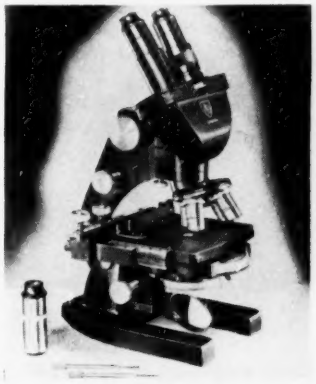
Glass Filament Pads Lick Dust Problem A

For use in forced air heating, ventilating, and air conditioning systems, a new replaceable type air filter known as Amer-glas has been announced.

Made in all standard sizes, these pads have a filtering media consisting of continuous strands of glass filaments held together at each point of contact by a high-temperature plastic bond. Thus, a resilient pad is formed. Sprayed on is an odorless and nonflammable adhesive. The filter is fitted in a fiberboard casing.

Dust laden air that encounters this filter is divided and sub-divided into innumerable fine streams which change direction many times in their travel. Dust particles, because of their inertia, cannot follow the changes in air flow. They are trapped upon the viscous-coated glass filaments.

These successive layers of trapped dust particles become saturated by capillary action and extend the adhesive film to trap other dust particles. This continues until the viscous coating has become completely absorbed by the dust deposit.—*American Air Filter Co., Inc., Louisville 8.*



New Phase Microscopes Are Lighter, Stronger B

Many improvements over the original models are claimed in a new series of phase microscopes with monocular and binocular bodies.

In describing the new instrument, company maker points out that phase turret condensers with interchangeable annular diaphragms are now available in hardened steel, centerable mount. Firmly held in the fork-type substage, the mount cannot tilt, thus the optical axis of the condenser and objective are kept in alignment.

The four annular diaphragms in the phase turret condenser may be centered to any series of four objectives. Long-focus annular diaphragms are also offered to provide adequate working distance above the stage for micro-manipulation work, tissue cultures, and the like.

Ball-bearing fine-focusing adjustment of microscope is termed responsive to lightest touch. Control knobs have been lowered to a more comfortable position nearer to the stage, thus providing adequate finger clearance. Graduated in two-micron intervals, the fine adjustment is accurate throughout its entire range of travel.

Tension on the dual coarse and substage focusing controls may be set to suit individual needs. A new "pinch-grip" mechanical stage permits rapid insertion of slides without disturbance. New quadruple dual-cone revolving nosepiece has an improved ball-and-groove spring stop to insure correct optical alignment of the objectives over many years.

The microscope arm and body are of

Handle LARGER Batches

. . . Discharge

AUTOMATICALLY

Now you can do more mixing in less time—with the Worthington-Ransome Rotating-Tilting Pan-Type Mixer.

The drum is not only motor-*rotated* . . . it's also motor-*tilted*. Push-button tilts drum to any angle while rotating —materials discharge *completely*, with no nuisance of scooping.

Capacities up to 3000 lb. reduce handling and re-handling and increase output.

Widely used for coating, coloring, tumbling, polishing and finishing on candies, gum, drug tablets, etc.—mixing powdered milk, relishes, dry gelatin, etc.

Write for Bulletin R-708 on Worthington-Ransome Mixers, built from designs developed from nearly a century of mixer experience.

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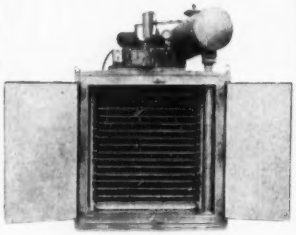
CONTACT PLATE FREEZER

(Patent Applied For)



(Illustrated Model B 15 Stations)

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Speedy and Labor Saving
Uniform Packages
Minimum Floor Space
Maximum Freezing Surface
Simple and Fool-Proof
Remarkable Flexibility
Handles various sized packages and various products in the one load.

Investigate Why
AMERIO FREEZERS SERVE YOU BETTER

Amerio
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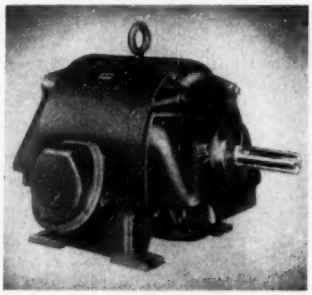
Union City, N.J.
"It's the Contacts that Count"

aluminum to reduce overall weight, yet are engineered for rigidity and long life. A separate leatherette covered accessory case accommodates the phase turret condenser, objectives, and centering telescope.—*American Optical Co., Southbridge, Mass.*

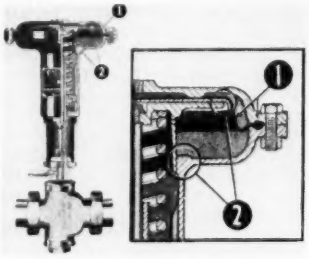


Steel Framework Features Splash-Proof Motors A

For applications where spattering liquids are encountered, new splash-proof Type CSP Life-Line induction motors have been announced.

These are squirrel-cage motors designed for constant speed applications both indoors and outdoors. They are protected from dripping or splashing liquids by solid rolled-steel frames and baffles in the end brackets and are equipped with prelubricated bearings. No lubrication is required for the life of the bearing.

Motors are available in 7½ to 100 hp., 60, 50, 25 cycles, 208, 220, 440, 550, 2,300v., NEMA standard dimensions; Frames 364 through 445.—*Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30.*



Positive Sealing Action Marks Control Valve B

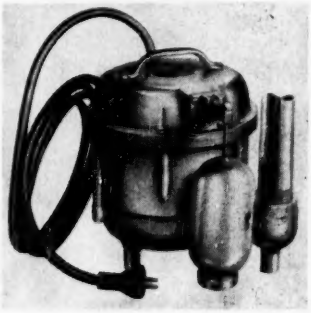
For regulating the flow of steam, water, oil or gases, there is offered a new air or water operated control valve known as the "Flowrite". Diaphragm operated, it is for pressures below 250 psi., in sizes ¼ through 2 in.

Durable molded neoprene diaphragm —see (1) in photo above—has positive sealing bead to provide increased sealing action with increasing control pressure. Diaphragm is specially formed for ample and constant operating power through full travel. Piston plate assembly (2) has a free floating thrust plate to absorb side thrust. Closely guided piston plate maintains stem in accurate alignment.

Adjusting screw is of the ball bearing non-rising type, easily accessible. Starting pressure is adjustable from 0 to 17 psi.

Bonnet assembly's polished stainless-steel stem in preformed lubricated metallic packing is intended for long life and low hysteresis.

Available are single or double seat, double unions and flanged ends, direct and reverse acting and 3-way valves in stainless steel and bronze bodies—*The Powers Regulator Co., 2720 Greenview Ave., Chicago 14.*



New High-Head Pump Runs Under Water C

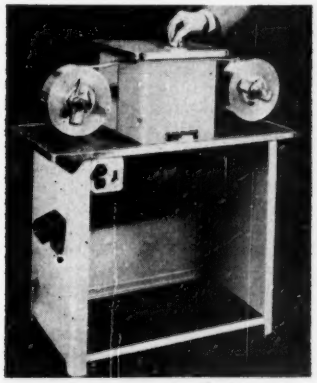
Stated suitable for many industrial applications is a new high-head submersible pump.

Furnished with or without automatic float control, the pump is supplied with ¼-hp. motor for 110v., 60 cycles, single phase a.c. Other voltages, frequencies, and special requirements can be engineered and built into the unit if desired.

Features include integrated motor and pump design with the one rotating part balanced for quiet operation, and sealed-in, compact aluminum castings for lightness. All exposed parts are of stainless steel, brass or bronze. Two permanently grease-packed seals afford protection against leakage.

Unit is equipped with bronze impeller, permanently lubricated ball bearings, and built-in automatic motor protection against overloads. Pumps

can be used in water up to 200 deg. F., and reportedly will withstand occasional exposure to steam.—*The Piqua Machine & Mfg. Co., Piqua, Ohio.*



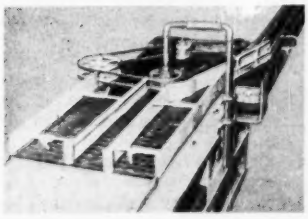
Semi-Automatic Packer Is Compact, Portable A

This semi-automatic machine completely makes and seals a package with practically any heat sealing material.

It has a speed of 30 to 60 units per min., depending upon the product to be packaged.

Operator simply drops the items through the opening in the top plate (see photo). They are then automatically packeted and sealed. The packages are cut off and slide out the chute.

Machine is compact, requiring only 1½ x 3 ft. of floor space and a height of 3 ft. It comes with one set of dies to make a specified-size package. Interchangeable dies to make any package size ranging from 1 in. to 6 in. square can be obtained as extras.—*Pak-Rapid, Inc., 530 North 21st St., Philadelphia 30.*

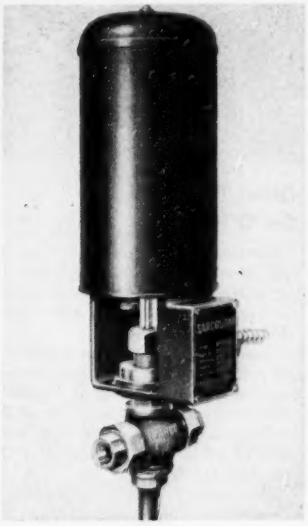


Guide Attachment Positions Flasks B

Here's a discharge attachment designed to improve unscrambling of panelled flasks, Type F spout cans, or almost any flat sided unit that must be conveyed in a specific position for proper labeling.

Capacity of unit depends upon size of container, with speed termed notably faster than that of an operator placing units on conveying line by hand.

Attachment is made of 3½-in. by ¼-in. flat steel with tubular adjustment on each side of guide line for quick and easy changing to suit size of unit being unscrambled. Guider is in two sections and can be readily placed on any Straightline Unscrambler.—*Island Equipment Corp., 27-01 Bridge Plaza North, Long Island City 1, N. Y.*



Hydraulic Motor Valve Operated by Controls C

The Sarcostat, a new electro-hydraulic motor valve for open-and-shut control operated automatically by thermostats, pressurestats, liquid level or flow controls, has been announced. As a shut-off valve in an inaccessible location, it can also be actuated by push-button. It is two-wire, normally closed, for direct connection to 110v. a.c. 60 cycles.

Valve is constructed to handle steam, oil, gas or air. When used on steam or water branch-heating mains for space heating, its gradual opening action protects the piping. Quick closing prevents overheating.

The valve operating device, actuated by hydraulic power, runs single-seated valves up to 1½-in., or double-seated up to 4-in. at 125 psi. This is accomplished by direct thrust without resort to pilots, gears or levers.

When full stroke is used, standard valves will open in 60 sec. and close in

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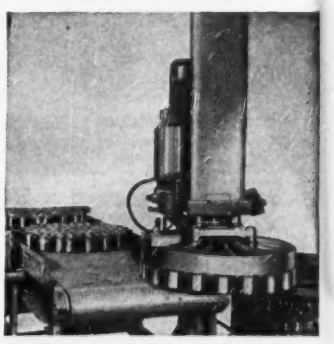
Cambridge Wire Belts shrug off extremes of temperatures, corrosive agents, torsion, strain and wear. They hustle rough, bulky objects through the most rigorous treating processes, or convey delicate products with maximum safety.

Tempering, quenching, washing, baking, sizing, sorting, packaging, glazing; throughout industry, Cambridge Wire Belts are working at nearly every bulk material processing job. Each of these Cambridge Belts is fabricated in the proper mesh, weave, metal or alloy to do the job better, faster, safer and more economically.

Let a Cambridge Field Engineer help you secure these advantages for your operation.



A Cambridge "Gratex" Wire Belt conveying baby food jars to a W. F. & John Barnes Junior Hydro-Magnetic Crate Loader and Unloader. The small-bottomed jars won't tip or trip when shuffled on this closely-woven belt.

Write for FREE copy of the 130-page, illustrated Cambridge Wire Belt Catalog. It's an education in belt and conveyor design, application, installation and operation.

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Wire cloth in rolls. Also specialized wire fabrications

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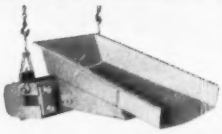
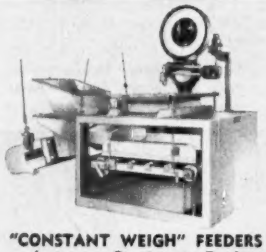
With Variable Control of Flow

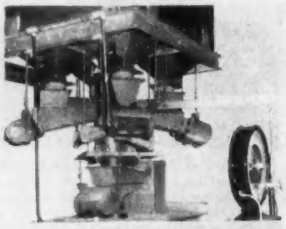


WILL HANDLE—most all types of bulk materials—from light, fine dry powders to heavy, coarse lumps—hot or cold—dry or damp. AT—variably controlled rates from pounds to hundreds of tons per hour —from 110, 220 or 440 volt, 50 or 60 cycle. TO—crushers, grinders, driers, furnaces, packaging machines, belts, mixers, etc.

OTHER PRODUCTS



"CONSTANT WEIGH" FEEDERS
Accurate, Continuous Feed by Weight



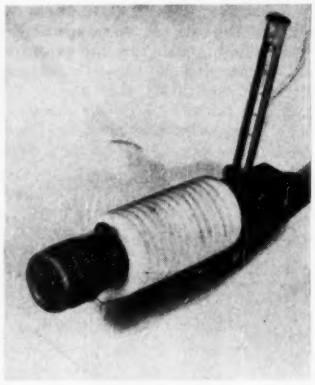
"Automatic" BATCH WEIGHING Scale—Controlled Vibratory Feeders

Electric Vibrators	Special Feeders
Screening Feeders	Dewatering Screens
Grizzly Feeders	Sieve Shakers
Picking Tables	Dry Feeder Machines
Elevator Feeders	Packers, Jolters
Spreader Feeders	Hopper Level Switches
Furnace Feeders	Shaft Seals
Parts Feeders	Rectifiers

AND
Complete Line of Portable Power Tools
Write for Literature

SYNTRON CO.
460 Lexington Ave. Homer City, Pa.

10 sec. An adjustable stop for partial throttling is available.—*Sarco Co., Inc., Empire State Bldg., New York City.*



Gives Fast Check On Oil Quality A

Simple, rapid determination of the quality of flaxseed and soybean oils, as measured by the "iodine number," is reported made with a new instrument recently developed.

Heretofore, the question whether an oil is suitable for use in foods has been resolved through use of an expensive refractometer, operated by a skilled technician. Answer depends on iodine number of the oil. Low number oils are best for foods.

New unit, a hand refractometer, is simpler, accordingly less costly. And no special skill is required to operate it. It gives the measurement of oil quality in about five minutes. New unit will soon be available commercially.—*Bausch & Lomb Optical Co., 635 St. Paul St., Rochester, N. Y.*

Insect Control Aided By Improved Sprayer B

Use of the new Vaposector-Mistorizer combination pictured here is reported to assure a thorough job of insect control. Featured is an improved 25-oz. portable ac.-dc. electric sprayer, adaptable to either area-fogging or direct-contact use.

Sprayer dispenses 1 oz. of insecticide per min. when used for fogging, and 1½ oz. per min. for contact spraying. A simple nozzle adjustment permits a quick change from fogging to contact spraying use.

The insecticide fluid is termed highly effective and fast-acting. And the maker states that when employed according to directions, there is no danger of contamination, corrosion, after-odor, staining or explosion. The fogging mist is designed to provide effective insect control at a concentration that avoids settling or condensation on surfaces.—*West Disinfecting Co., 42-16 West St., Long Island City.*

Lightness, Efficiency Mark New Hand Hoist C

Use of this lightweight (37 lb.) ½-ton hand-chain hoist is stated to enable one man to lift 1,000 lb. "with less work than it takes to climb an average flight of stairs." For example, the ½-ton capacity model has a 95 percent efficiency, permitting full load to be easily raised 3-ft. in 20 sec.

Big feature is its "carry around" lightness, credited to use of high strength aluminum castings and alloy steel.

Called the Load King, its high speed operation is due to minimizing of friction. All rotary shafts have ball bearings and parts are precision machined.

Balanced and cushioned springs force engagement of a six-tooth pawl and a 24-tooth rachet, assuring immediate braking action. Stabilizer ring speeds brake release for precise inching when lowering.

Chain of heat-treated steel provides standard lift of 8 ft., but other chain

To Stop Those Slips A

For use where wet, smooth surfaces present a safety hazard, the new type non-skid sandals called Slogs are stated to have proved very efficient in eliminating accidents due to slipping. Workmen report increased efficiency through use of the sandals, which lessen fear of falling while accomplishing job.—*Bellerose Products Co., 24 Kerwin Place, Tarrytown, N. Y.*

lengths are available.—*The Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15.*

Roller Type Sealer Speeds Packaging B

Irregular shaped foodstuffs, such as hams and red meat cuts, are reported packaged faster with a new type iron.

This tool is essentially a light-weight heated sleeve which can be rolled easily across the surfaces to be sealed. Rolling action tends to smooth the protruding edges or "ears" of the film, instead of crushing them flat; thus resulting in a neater package.

Maker states that roller sealing surface develops much less friction than the flat-shoe type of iron, and hence less effort is required by operator and wrapping efficiency is thus increased.—*Goodyear Tire & Rubber Co., Akron.*

LEADING PACKERS choose new Model FA-2 for High Speed Bacon Wrapping

When you find one packer after another installing a new machine, you can be sure it must have outstanding merit. This is the case with our Model FA-2, which we have designed especially for wrapping bacon *at high speed*. This machine not only produces up to 60 packages per minute, but turns out a more securely sealed wrap. Ends of wrap are crimp-sealed and then turned under the package and sealed over the bottom seam. This tight seal keeps the bacon in first-class condition and insures a smooth-looking, attractive package that stands out in competition.

The FA-2 uses printed cellophane or accetate, accurately registered on the package. Unprinted cellophane or acetate may also be used. Can be quickly adjusted for any desired speed up to 60 per minute, and for packages of varying size.

The FA-2 pays for itself in a very short time through savings in labor and wrapping material. So get all the facts. Write our nearest office today.

PACKAGE MACHINERY COMPANY
SPRINGFIELD MASSACHUSETTS

NEW YORK CHICAGO BOSTON CLEVELAND ATLANTA DALLAS
DENVER LOS ANGELES SAN FRANCISCO SEATTLE TORONTO MEXICO, D.F.

Meet the BEMIS Small Bag Family

These Bemis Bags belong on your packaging team. Here's why: They fill and pack economically. That helps your costs. They give unbeatable display to your brand. That helps your sales. They are good packages and consumers realize it. And that helps everybody.

Get the full details of the Bemis small bag story. Write or phone your Bemis man today.

A Winner for You

Bemis DELTASEAL Bags (flat-tube) have the exclusive and popular Pull-Cut-Pour Spout. The white coated or bleached paper makes your brand stand out on all sides like a million. The squared shape makes for eye-filling mass displays.

Bemis FLEXI-CARTON — In-tuck bags that square up beautifully and billboard your colorful brand all around. Like Deltaseal, these are economical bags worthy of your good product. A variety of types of closures available.

Bemis CELLOPHANE Bags are increasingly preferred for many foods, chemicals and other products. Cellophane is a showcase for your merchandise. And the brilliant color printing on Bemis Cellophane Bags shouts for attention.

Bemis WINDOW BAGS give you the advantage of Bemis' fine printing on white coated or bleached paper, *plus* the extra sales appeal of the window view of your product. These bags have the Deltaseal construction and the Pull-Cut-Pour Spout

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New York City • Peoria
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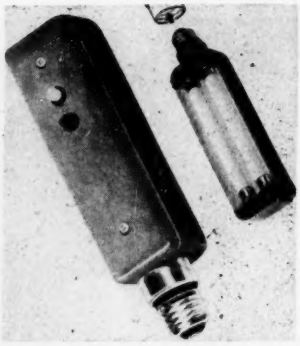
Bemis

BEMIS BRO. BAG COMPANY



Screw-In Fluorescent A

You may now convert from hot incandescent work lights to cool fluorescents simply by screwing a Lite-Mite "bulb" into any ordinary lamp socket. Light shade can be rotated 300 deg. for efficient focusing. Unit contains two 4w. fluorescent lamps and all control components entirely with 2 x 4-in. shade.—*Stocker & Yale, Marblehead, Mass.*

Equipment Briefs

More Motor Protection, Accessibility B

Standard line of large, bracket-bearing, squirrel-cage induction motors of four or more poles has been redesigned to provide more protection and greater accessibility.—*Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.*

Pistol-Grip Nut Runners C

Two new air-operated pistol-grip Impactools for nut running have been announced. Size 504 is for ⅜-in. bolts, 510 for ¾-in. bolts. Former weighs 5¾ lb., latter 11¼ lb. These models are reported more powerful and less noisy than o'd.—*Ingersoll-Rand Co., 11 Bway., New York 4.*

Chemically Inert Packing D

Frictionless and corrosion-proof V-type packings for hydraulic valves combine the chemically inert properties of Teflon with resilience and toughness needed for proper sealing results. Molded by a specially developed process and able to withstand temperatures to 450 deg. F. they are called Chemlon type packing.—*Crane Packing Co., 1800 Cuyler Ave., Chicago 13.*

Streamlined Jet Cleaner E

A high pressure jet cleaner delivers a large volume of hot water, mixed with a detergent or solvent if desired, that quickly and effectively serves for the daily clean-up in food plants. Made of sleek chromium-nickel steel, it can double the supply steam pressure.—*Sellers Injector Corp., Philadelphia.*

Variable Speed Motors F

Speed-Trol electric power drives are now available in single-phase capacitor-type design, in ratings of ¼ to 3 hp. inclusive. Maker states they provide infinite speed variation in practically any given range. New design includes fingertip speed control, one piece cast iron drip-proof frame, and standard NEMA mounting dimensions.—*Sterling Electric Motors, Inc., Los Angeles 22.* —End

America's Road to Victory

. . . Let's Increase Production

This is the time to speak out—now—at the beginning.

Our industrial program for re-armament is getting off on the wrong foot.

The talking and writing about it emphasize the wrong things.

Its headline words are "cuts" and "controls."

Those words make bad propaganda for the cold war.

"Cuts" and "controls" are no words to challenge the imagination and energy of our own people. They won't impress the masters of the Kremlin. And they can only make it appear to the rest of the world that America thinks it can defend the free way of life by abandoning it.

America stands as the world's champion against aggression because America has become the most powerful free nation in the world.

How did we get that way?

Not by putting ceilings on wages; not by rationing or clamping iron-clad government controls all over business and industry.

To be sure, some temporary controls are necessary to channel very scarce materials speedily to use for defense. So, too, are special taxes and credit restrictions needed to combat inflation. But they will be fatal if they blind us to this fact:

We became the strongest nation in the world by out-producing every other nation.

Production—The Final Answer

Next year our government is planning at least a $40 billion military program. Instead of planning only on controls to divert $40 billion of production from the making of civilian goods to the making of military supplies, we should be figuring out also ways to push up total production.

Of course, our industrial plant is running at close to "capacity" now. And our labor force has reached almost full employment. There isn't much slack to be taken up.

Can even the United States add a $40 billion miracle of production on top of what it is already doing?

Our answer is "Yes"—and within two years. It can be done by adding about $6 billion each year to our program of capital investment which now runs about $22 billion a year.

Part of this added production will come from expanding our industries. The steel companies, for example, already have plans to increase their capacity almost ten per cent in the next two years.

But by far the largest part of that $40 billion of added production must come from higher productivity—raising industry's efficiency.

continued on next page

To meet our goals we need to raise our productivity five per cent a year.

Can it be done?

The answer is an emphatic "Yes."

Raise Industry's Productivity

McGraw-Hill's studies of industry's equipment show that there are countless opportunities for improving efficiency. Our manufacturing industries alone need at least $35 billion of new equipment to raise their facilities to first class technical standards.

Here are some of the broad possibilities reported by the trained editors of McGraw-Hill's business magazines:

In many manufacturing plants as much as 40 per cent of workers' time goes into moving materials and parts—shifting things about within the plant between processes and to and from shipping platforms.

FACTORY estimates that improved materials handling equipment and methods might well cut handling costs twenty-five per cent and save annually over 650,000 man-years of unnecessary labor.

Modern machine tools designed since World War II are 40 per cent more productive, on the average, than is old equipment. But AMERICAN MACHINIST surveys show that 95 per cent of industry's machine tools are of designs at least ten years old. Replacing them could raise productivity of the metalworking industries at least ten per cent—enough to absorb a major share of the metalworking industries' part of the defense program as now planned.

In coal mining, latest equipment and methods can raise productivity sharply. The editors of COAL AGE estimate that production of bituminous coal could be raised from seven tons per man-shift to ten within three to five years.

Many new textile production techniques are 50 per cent to 75 per cent more efficient than those in use now. If plants could be fully modernized, and full use made of latest management methods, TEXTILE WORLD estimates that output-per-manhour would rise 20 per cent. *A FOOD INDUSTRIES study indicates that modern equipment plus the best management techniques could raise productivity in food processing at least 20 per cent.*

These are just some of the opportunities that industry can seize and by which the nation can profit.

A Nation-Wide Effort

Of course, industry itself can't do the whole job. Labor, government and all the rest of us must cooperate.

Government's part is to see that its emergency controls are so applied that they will increase productivity and thus make possible an early lifting of such controls.

Labor's part is to help in the development of labor-saving methods and machinery and to welcome their adoption as the only sure way of continuing to advance the American standard of living while maintaining the American free way of life.

For all of us the job is to work constantly for an expanding, ever-stronger America with constantly growing productivity; not a pinched and shackled America cooped up under wage and price ceilings and tied to a ration card.

Challenge to Industry

Here is a sharp challenge to industry to study the best work-methods that are being reported—to use every minute and every dollar it can to replace obsolete equipment.

Here is a sharp challenge to government to do everything within its power to make its control policies and its fiscal policies strengthen the incentives to industrial modernization—to demand sacrifice for a purpose and not for effect.

The job to which such opportunities point will take time—though nothing holds back adoption of some of the simpler improvements in work-methods reported in business magazines all the time.

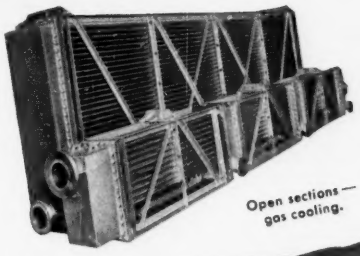
But increasing production is our one best hope that we may be spared the full array of price, wage and production controls now and be freed eventually from all controls.

General Omar Bradley has said that the protection of our national independence calls for "long-range commitments that we are willing to carry out."

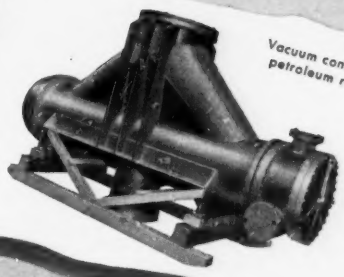
A long-range commitment to fight this battle for peace with America's most powerful weapon—industrial productivity—is the surest guarantee of victory for the free world.

Let's make that commitment—now—at the beginning.

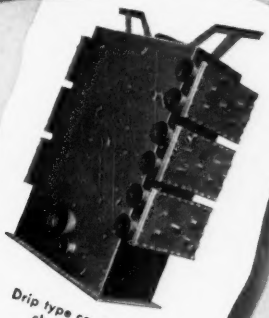
McGraw-Hill Publishing Co., Inc.



Open sections — gas cooling.

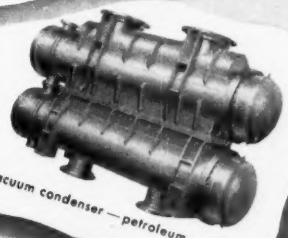


Vacuum condenser — petroleum refining.



Drip type condenser — chemical plant.

Special block tin coil — cooling essential oils in perfume manufacturing.



Vacuum condenser — petroleum refining.

"Specials," too

OFFER YOU UNIQUE ADVANTAGES HERE

The emphasis which Ross places on standardized small and medium sized exchangers, never for a moment overlooks the prime importance of special units. For the same engineering knowledge and manufacturing skill that built Ross' reputation in standardization, have built Ross' reputation in the field of specialization.

Those who require "specials" for individual process applications are, therefore, offered equally unique advantages here. For the Ross organization has built most every conceivable kind of unit for all manner of heat transfer problems. The experience and knowledge gained over the years can be a real advantage to you.

Remember that Ross "standard" units were once "specials". The same engineering knowledge and skill that made them possible can be well applied to your problems. Yes, you'll be far ahead by consulting early with Ross engineers to benefit from their singular know-how and experience.

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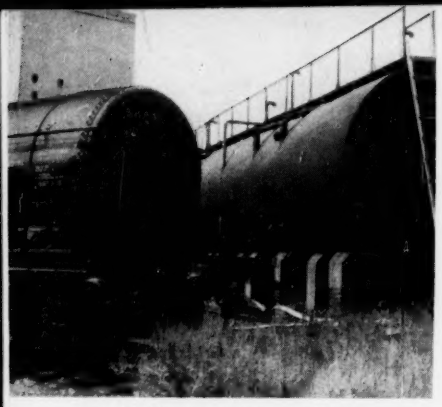
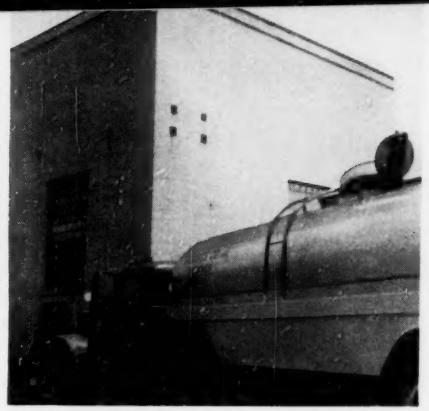
TURN PAGE FOR FOLDOUT FLOWSHEET →



1 **TANK CAR** delivers 43-deg. Baume corn syrup into 30,000-gal. tank.



2 **LIQUID SUGAR** (67-deg. Brix) is pumped from tank truck into 12,000-gal. storage tanks.

UNFOLD HERE

A-to-Z In Making Hard Candies

Confections Now Turned Out Continuously by High-Speed Automatic Units

THREE WORDS—astute line engineering—reveal the major theme behind the achievement of greater and more economical output of uniform hard candies in the plant of Charms, Inc., Bloomfield, N. J.

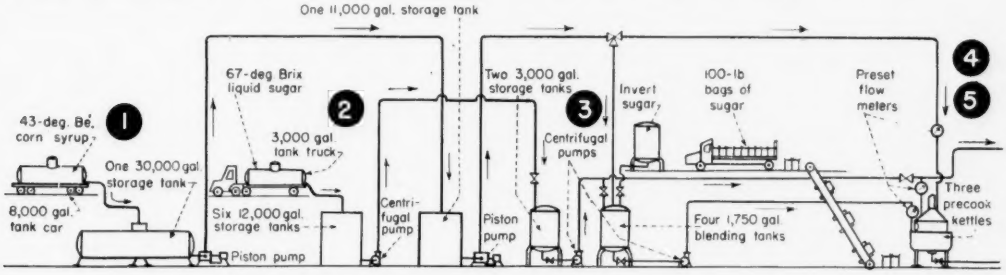
How this carefully planned engineering won the objectives is shown in overall view by the accompanying foldout flowsheet, where all the equipment, its arrangement, and the unit relationships are sketched out, along with number-keyed photos providing closeups of the operations.

Wherever possible, the tedious job of handling 100-lb. bags of sugar has been almost completely replaced by the more efficient method of metering liquid sugar and corn syrup directly into process—depicted at Point 4.

Next step is cooking—Points 5, 6, & 7. Here, two different cooking operations are conducted—one for the drops, lollipops, and striped or fruit-filled pieces; and the other for the Charms' hard candy tablets.

For making the drops, lollipops, and similar pieces, 700-lb. batches of candy are precooked to 238 deg. F., and then cooked to about 285 deg. F. in a continuous vacuum cooker. Next, the candy is cooled on water-jacketed slabs, where color and flavor are added before the confection goes to the high-speed, automatic forming machine to be shaped.

FI PICTURE-FLOWSHEET NO. 24 SUGAR & SYRUP HANDLING



Tablet-shaped candies are precooked in 300-lb. batches that are then cooked in company-made vacuum kettles. As each batch is cooled on the slabs, flavor and color are added.

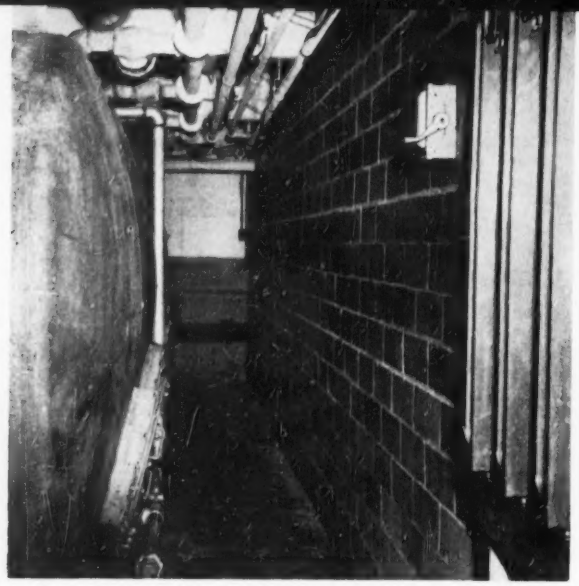
On leaving the cooling slabs, the candy is carried to the batch spinner—Point 8—where it is formed into a roll of 2-in.-dia. As this rope travels through five sets of rolls, it is reduced to a $\frac{3}{4}$x$\frac{1}{4}$-in. strip. And then the strip feeds into a forming machine that cuts the ribbon of candy into 1,000 tablets a min.

Now comes the cooling operation—Point 11. Tablets travel 350 ft. on a wire-mesh belt in an insulated air-conditioned room, where the temperature is kept at 68 deg. F. and the relative humidity at 45 percent.

After mixing the different flavored candies into an assortment, they are finally wrapped—Point 12. High speed machines cover each tablet with cellophane and heat-seal. An automatic device then stacks the tablets in groups of ten. Next, each ten-tablet unit is over-wrapped in a laminated foil wrapper that is heat-sealed. Packages are finally put into display cartons that are wrapped in cellophane.

Volume Through Mechanization

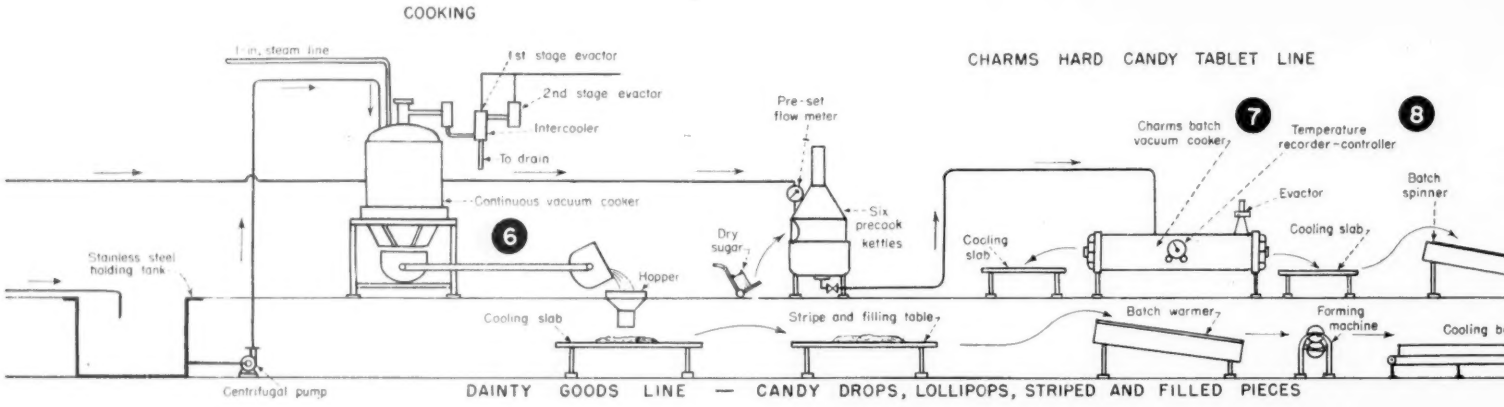
Complete story of Charms' mass manufacture of hard confections—detailing how fast machines were marshalled to meet the multiplying demands—is lucidly related in the special article, "Bottlenecks Licked by Mechanizing," on page 40.



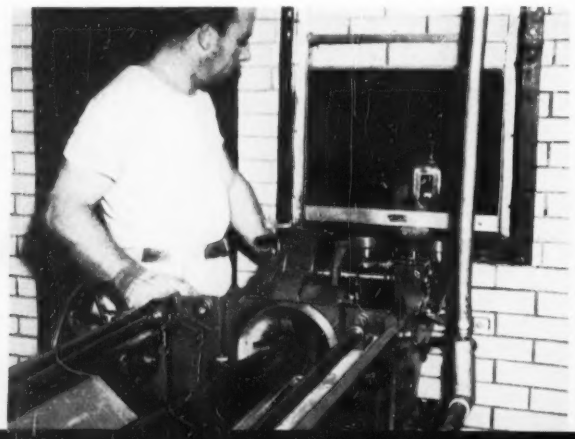
3 **SYRUPS**—liquid sugar, corn, and invert—are blended here in four 1,750-gal. tanks, according to specifications.

4 **PRESET METERS** automatically deliver predetermined amounts of syrup directly into precook kettles.

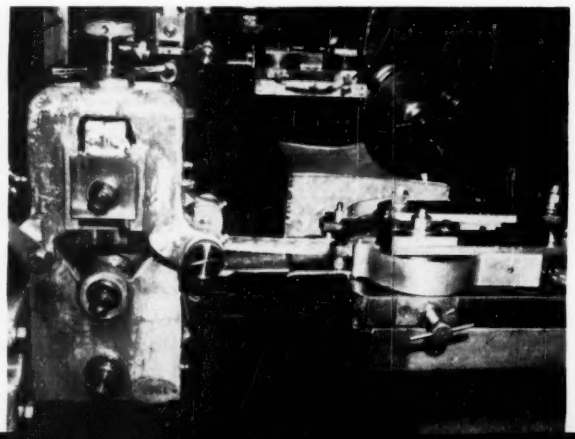
5 **CANDY** is precooked to 238 deg. F. in copper kettles. Then candy goes to cook



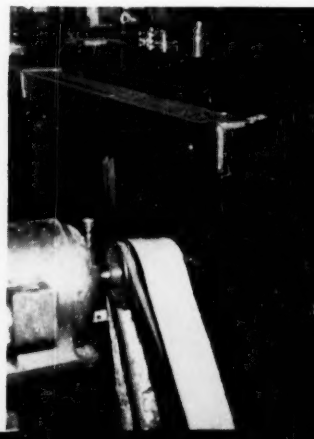
9 **ROPE** of candy now goes through five sets of rolls that reduce it to a strip. Sizers remove air bubbles from candy.



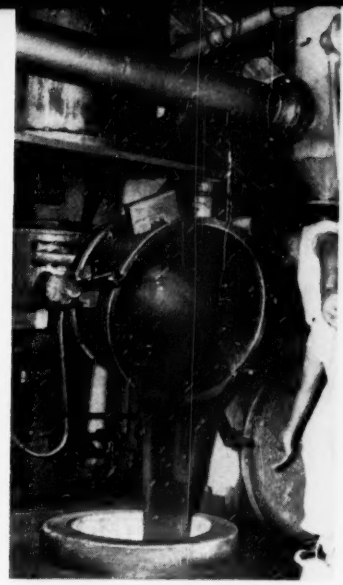
10 **TABLET-FORMING UNIT** (extreme right) stamps out 1,000 pieces every minute from candy strip.



11 **WIRE-MESH BELT** carries candy room, where confections are quick

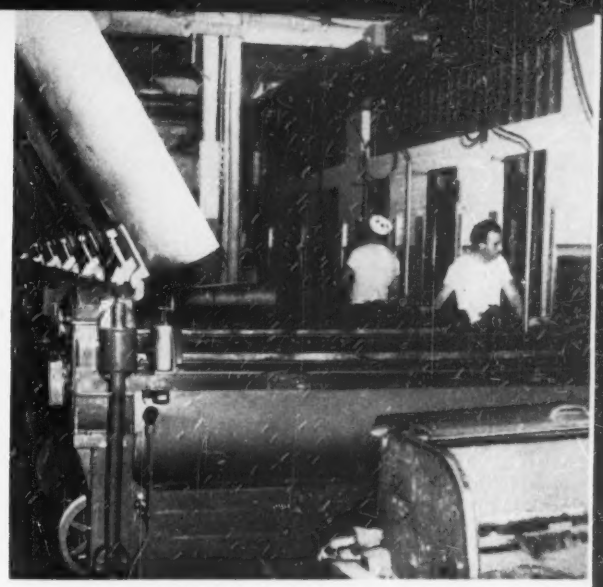


F. in steam-jacketed
cookers.

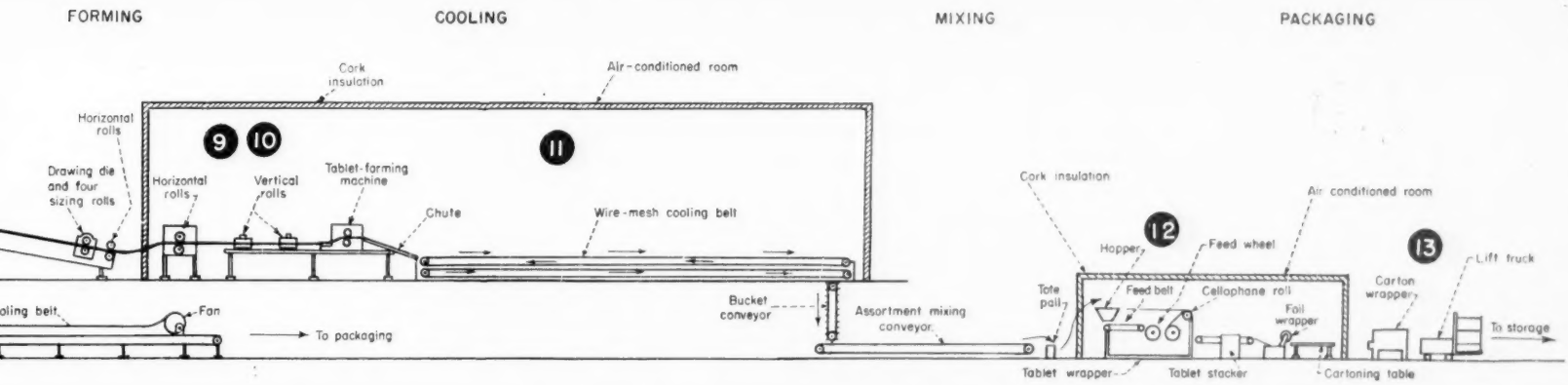


6 **CONTINUOUS COOKER** handles a 250-lb. batch every 6 min.

7 **PIPE-SHAPED** vacuum cooker prepares a 300-lb. batch every 22 min. Candy is used for tablets.



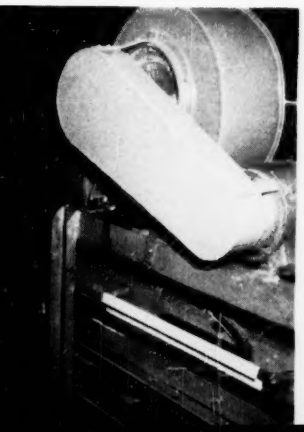
8 **IN THIS** battery of batch spinners, 150-lb. lots of candy are formed into 2-in.-diameter rolls.

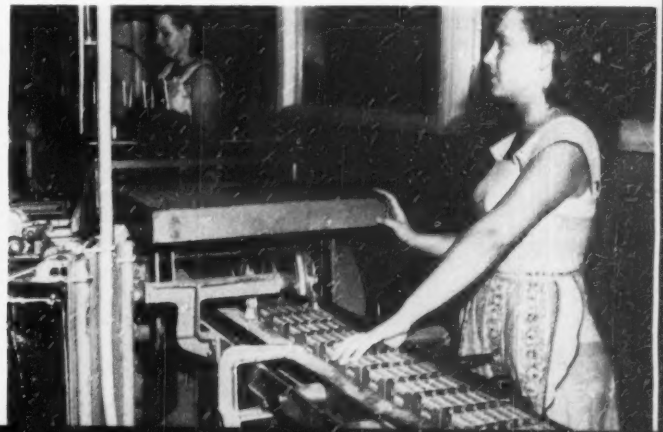


candy tablets through air-conditioned
quickly cooled.

12 **HIGH-SPEED** packaging machine cellophane-wraps 300 tablets per min. Pieces are then stacked in ten-tablet units that are overwrapped.

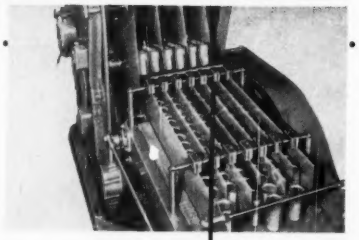
13 **DISPLAY CARTONS,** containing 20 nickel-size packages, go to machine for automatic overwrap in cellophane and heat-sealing.



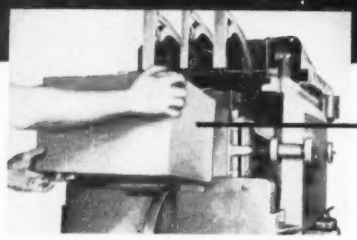


TAKE THE SHOCK OUT OF CASING

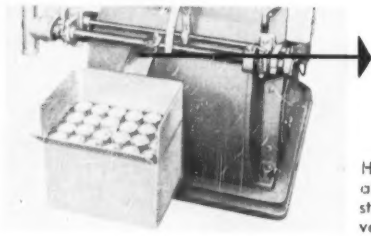
WITH A NEW MODEL 3 fmc Non-Shock Caser

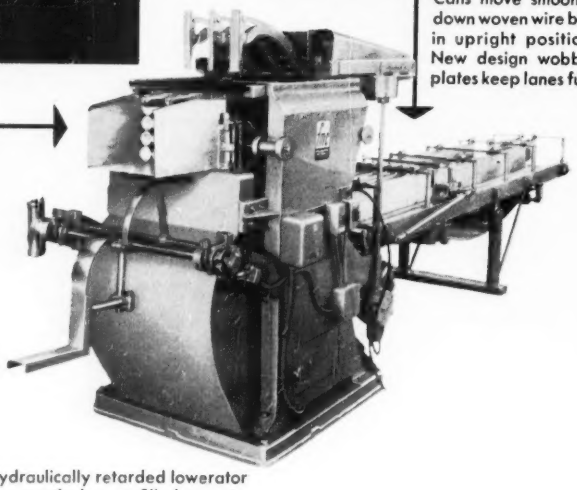


Cans move smoothly down woven wire belt in upright position: New design wobble plates keep lanes full.



Lower flap of empty carton activates lowerator arm and pusher arms, which fill and lower case automatically.



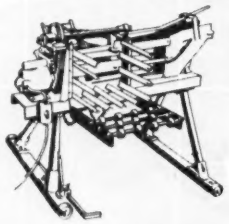


Hydraulically retarded lowerator arm gently lowers filled case to straight-line, right-angle or reverse take-off system.

Combining high speed operation with product-protecting "non-shock" features, the new Model 3 FMC Non-Shock Caser completely eliminates damaging impact—from feed chute to filled case take-off. New design maintains a high capacity—1200 or more cases per hour with one operator—while providing exceptionally gentle handling for even the most tender products. Operator simply slips an empty case over the chute. The FMC Non-Shock Caser does the rest—automatically, efficiently, and with full protection of cans, labels and product.

Write for full information, or call your nearest FMC representative.

FMC-KYLER CASER



Motor-driven and hand operated models, extremely rugged and simple, are efficiently adaptable to small capacity operations.

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CASE HISTORY FROM CRANE FILES

PROBLEM: To find a valve that would assure longer servi batch processing operation, and reduce costs of routine pi

WORKING CONDITIONS: Valve to control flow of ste steam-heated steeping tanks. Constantly exposed to wea

SOLUTION: Crane No. 1611 Diaphragm Valves, i design, with separate disc and diaphragm.

RESULT: Costly problem of frequent repacking comple a penny's maintenance cost—not a sign of corrosion or or wear on internal parts—even after 4 years' servic Crane Diaphragm Valves have already given more tha double the repair-free service obtained from conve tional valves.

More proof of the fact that in all types of valves, Crane Qua assures the lowest cost service in the long run. That's why **More CRANE VALVES are used than any other mak**

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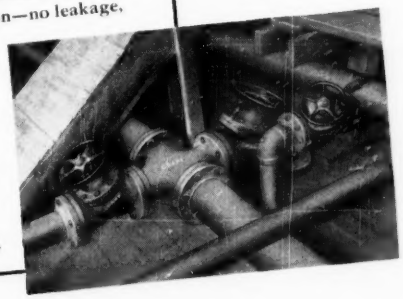

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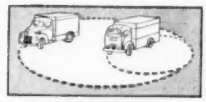
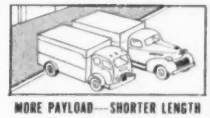
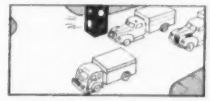
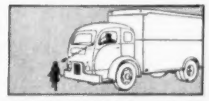

GREATER MANEUVERABILITY


MORE PAYLOAD—SHORTER LENGTH

NEW CAB SAVES DRIVER TIME


MORE EFFICIENT IN TRAFFIC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Its every feature provides *more* deliveries in *less* time . . . at *lower* cost, because it is designed for your business . . . for today's heavy traffic.

The new White 3000 is tomorrow's truck *today!* The world's most useful motor truck for your kind of delivery service.

Ask your White Representative for facts about the New White 3000 for your business

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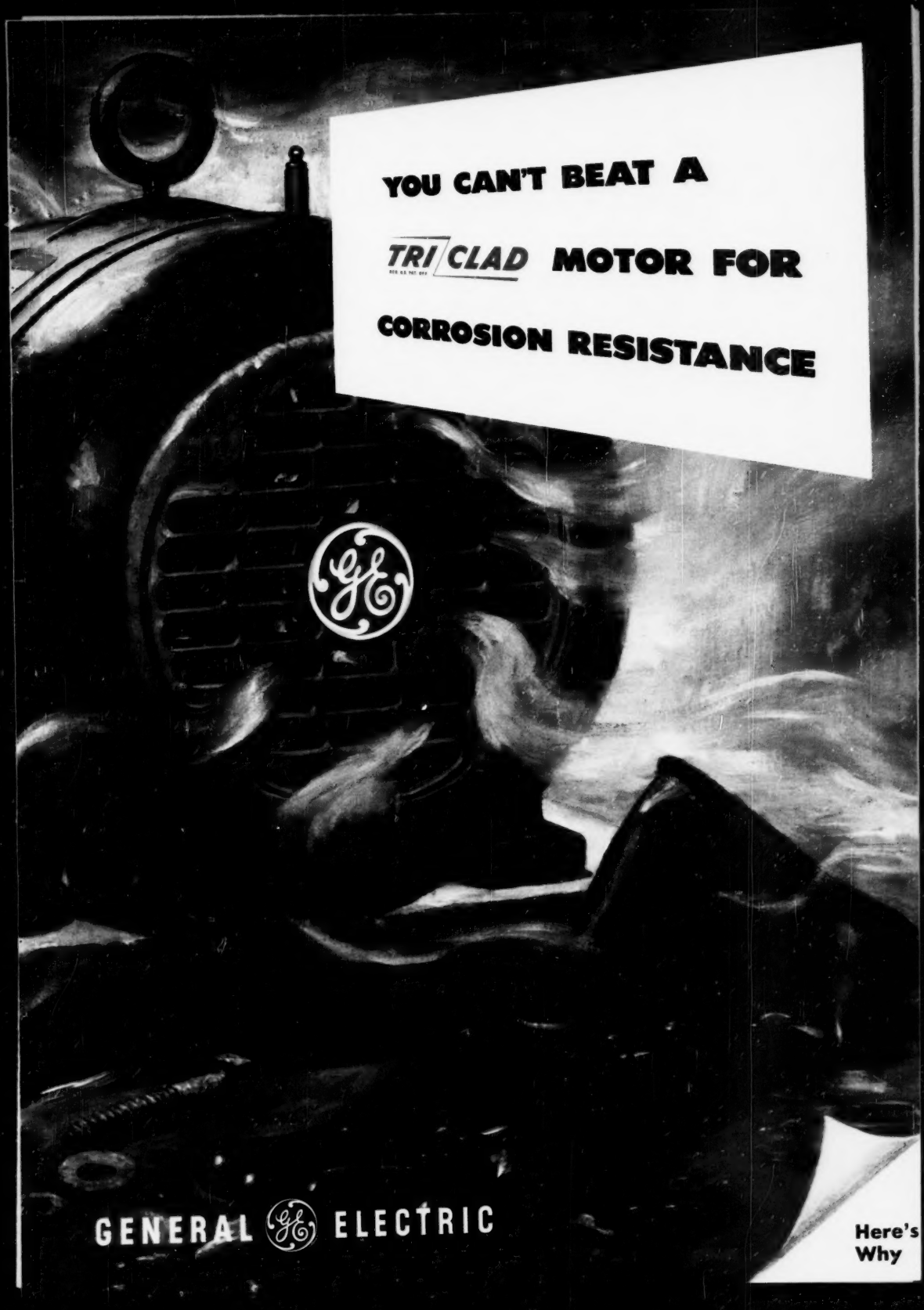
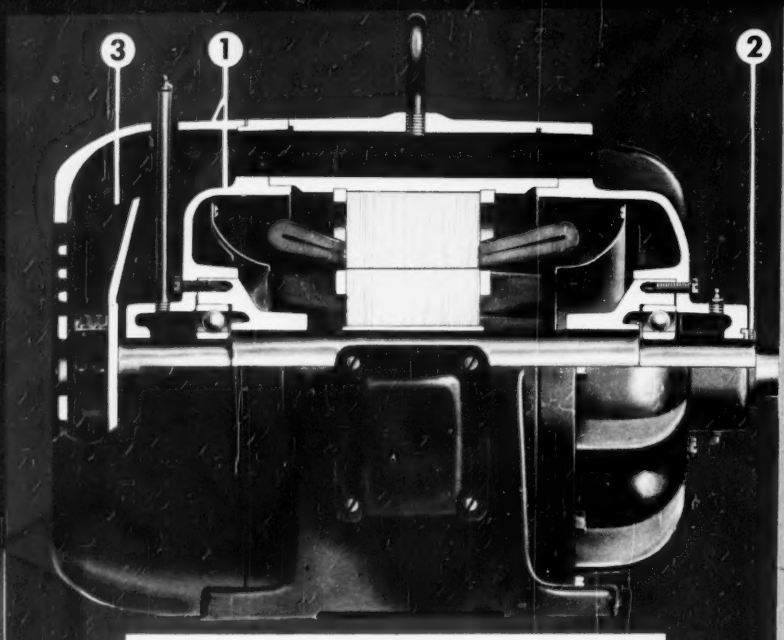

YOU CAN'T BEAT A
TRI CLAD MOTOR FOR
CORROSION RESISTANCE
GENERAL ELECTRIC
Here's Why



Here's the totally enclosed Tri-Clad double-shell structure (1) that locks out dirt, flying metal chips, abrasive dust and corrosive fumes. Check the rotating labyrinth seal (2) which prevents foreign matter from working in along the shaft. Note the cast-iron housing, the corrosion-resistant G-E Textolite* material cooling fan (3). Fan circulates cooling air between the shells – no contaminated air touches the punchings or inside parts.

You can't beat TRI/CLAD motors for corrosion resistance

Acid fumes, alkali dust, dye-house vapors, tropical weather – you name *your* motor "poison." You just can't beat Tri-Clad cast-iron construction for corrosion resistance.

Rolling up 6 billion hours of service on all kinds of jobs, more than 1,876,000 Tri-Clad motors tell the eye-opening story of cast-iron motor structure. You get an inherent damping action that minimizes noise and damaging vibration. You get rigidity that makes for permanent shaft alignment. (Try bolting a Tri-Clad motor to an uneven surface – the bolt will snap before you can twist the rigid frame out of line.) You get extra protection against jarring blows and rough handling. You get resistance to rust and corrosion that is not approached by any other metal used for standard motor construction today.

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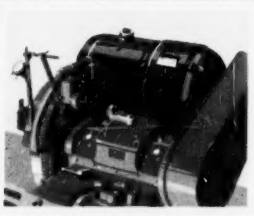
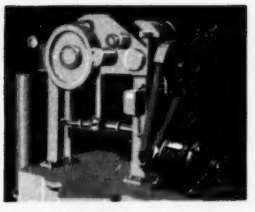
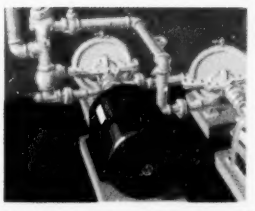
G-E capacitor motors for use on fans, blowers, pumps and compressors with single-phase power. From ¾ to 5 hp.



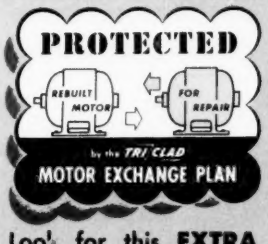
G-E Type ACA induction motors for adjustable speeds—provide speed ranges from 3-1 to 20-1. From 3 to 75 hp.



G-E open (dripproof) induction motors for constant-load, constant-speed applications. From 1 to 2000 hp.



G-E totally enclosed motors for outdoor operation, in abrasive dusts, or corrosive fumes. From 1 to 1000 hp.



Look for this **EXTRA** on the motor you buy!

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To all our friends in the Baking, Milling, and other Food Industries, our sincere wishes for a Merry Christmas and a Happy and Prosperous New Year.

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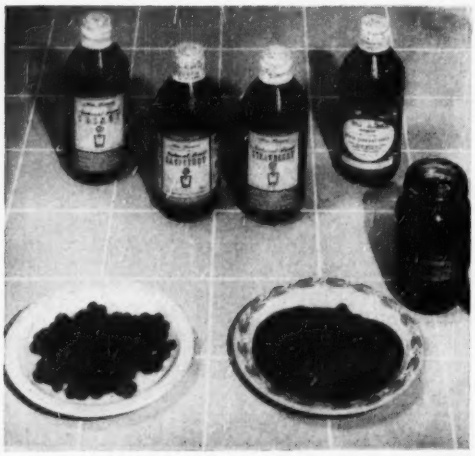
New Packages and Products



Lingonberries Gaining Popularity

An old European favorite, lingonberries, is now making headway in the American market. Somewhat similar to cranberries in looks, they are for serving with meat dishes or for use as a spread. In picture, dish at left holds raw lingonberries, while finished sauce product is at right. Jar that appears on grocers' shelves is also shown.

Only ingredients in the preserve are pure whole fruit and powdered cane sugar. No pectin is necessary.

Processor, Farmersfriend Products, Inc., New York City, imports the berries from Europe. They come packed in water, since lingonberries need no preservative. The raw berries are cooked to 200 deg. F. to remove 90 percent of the water and to soften them. Powdered cane sugar is added, the mixture being 55 percent fruit, 45 percent sugar. It is stirred and heated to 220 deg. F. for 5 min. to cook out remainder of water, then directly filled into 1-lb. jars.

Larger tin containers serve the institutional trade.

The company also makes the four syrups pictured in the background. They are for use on pancakes, desserts and the like, also are equally good mixed with soda water.

These products contain only cane sugar and pure juice from either raspberries, strawberries, cherries or black currants. The following outline for preparation of raspberry syrup was revealed. The other flavors are made similarly.

Highly flavored raspberries grown on the West Coast are exposed to the atmosphere in 375-lb. wooden barrels from two to four weeks, depending on the berries' moisture content. Juice is recovered in rack-and-cloth presses and filtered through asbestos sheets. Cooking and pasteurization follow. Juice is filled into 5-gal. jugs and allowed to stand at room temperature for "seasoning." Then cane sugar is added, to the proportion of 65 percent, and the mixture heated again. It goes through sand and gravel filters into the 12-oz. jars pictured.

No preservative, color or acid is added. And the syrup is stated to keep for many years. All processing equipment is stainless steel or copper.

At present, the raspberry flavor is the biggest seller, but others are doing well also.

Pure Butter Fat Concentrate

Stated to have the characteristics of butter fat, except that it will not go rancid, is Butr-Trate, a pure butter fat concentrate. It is made of processed butterfat (99.75 percent) and culture derivatives (0.25 percent) with butylated hydrox anisole added as a preservative.

The concentrate was introduced to the bakery trade a year ago and has been received well. It will soon be offered to ice cream makers, canners and confectioners. E. R. Mollner Co., Los Angeles, developed and is marketing the product.

Directions state that no refrigeration is necessary. But in a warm shop, the butterfat will become semiliquid. Normal room temperature is recommended.

"Starchless" Macaroni, Spaghetti

Latest addition to a line of low-calorie foods made with flour ground from the American artichoke are folded parsley spaghetti and parsley noodles, pictured here in front, together with a sample of the basic flour. They are often referred to as "starchless."

The spaghetti is made of parsley, eggs, high gluten flour and, of course, American artichoke. It is pale green and no artificial coloring is added. Ingredients in the noodles are the same.

The American artichoke differs from the better known Jerusalem variety, in that it is a tuber which grows like a potato. The Jerusalem type is a leafy flower that grows on a bush.

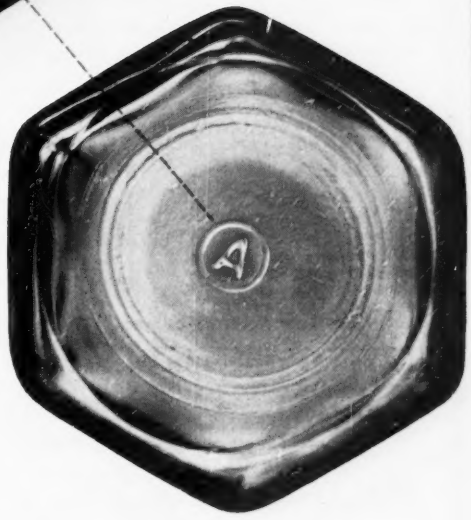
Shown in photo's background is the rest of the line. All these products employ artichoke flour as the basic ingredient. From left to right, there are spinach noodles, sticks, medium noodles, wide noodles, folded spinach spaghetti, rusks, and folded spaghetti.

Anthony Alphonse de Bole of New York City is the processor. He grows the plant, has it ground to a levulose-rich, non-starch flour, processes the various items, then packages them in a windowed cardboard container overwrapped with cellophane. Main outlets are health food stores and the institutional trade. There is a sizable mail order business, too.

The mark

that means

good glass



From the model-maker's craftsmanship to the finished ware, the Armstrong aim is quality glass that will be a credit to the Ⓐ mark. We'd like to show you how the meticulous care of our glass craftsmen can help produce dependable containers for you. Contact your Armstrong representative or write to Armstrong Cork Company, Glass and Closure Division, 4212 Prince Street, Lancaster, Pennsylvania.

ARMSTRONG'S GLASS

Quality here

starts with accurate measurement here

It takes absolute uniformity of quality to keep your brand on top. You lose customers the minute your flavor wavers. That's why so many leading brands depend upon the unfailing accuracy of Neptune liquid meters.

Use them for batching and blending. With the new Auto-Stop meter, you just push buttons to set the quantity of liquid sugar, syrup, oils or water you want. The meter automatically stops at the right amount. Everything enclosed—the attractive, cream colored meter delivers directly to the kettle.

Neptune meters pay for themselves by eliminating spoilage, spillage, overfilling, and the unsanitary muss and fuss of gauge sticks, pails, or batch tanks. Use them for metering interdepartmental use, too, for accurate cost accounting and inventory. Positive displacement type, quality built, simple in design for sustained accuracy. Bronze construction. Many types available for handling over 100 different liquids. Write or phone for more facts today.

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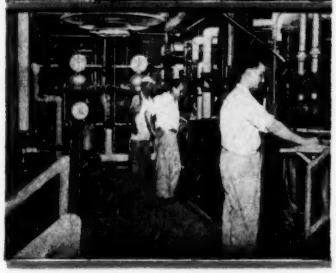

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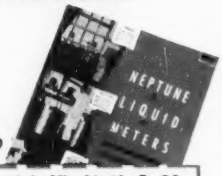

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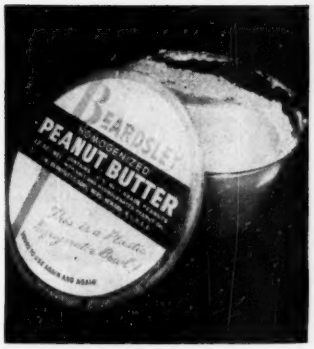


Peanut Butter in Plastic

Now being packaged in an all plastic container is the peanut butter made by J. W. Beardsley's Sons, Newark, N. J. Since this move is still new, there is no report on how consumers are taking to the novel presentation.

The bowl is a rigid styrene plastic, while the cover is flexible polethylene. Photo at right shows automatic filling operation, 12 oz. to a container.

Groom New Dry Cereal

The Kellogg Co., Battle Creek, Mich., is planning to introduce its new ready-to-eat cereal, Corn Pops, early in 1951. It's in the form of crisp, caramel-coated corn bubbles that have been gun-puffed and sweetened. This makes possible their use as both a breakfast food and snack.

Recent survey of 800 families who sampled the product was very encouraging, according to the company.

Time-Saving Canned Parfait

A cream parfait that can be eaten right from the can has been introduced by Twin Gabel Foods, Inc., Brooklyn, N. Y. Called Par-T-Fay, it stays jelled at room temperature and, of course, eliminates setting and freezing as well as cooking, stirring and cleaning up.

Ingredients are whole milk, cream, sugar, dextrose, flavoring, gel, vegetable gum, salt, spice and water. It can be re-molded by heating and allowing to cool at room temperature. Chilling in refrigerator enhances the taste.

Four flavors are being made—chocolate, vanilla, butterscotch and strawberry.

Frozen Crab In the Shell

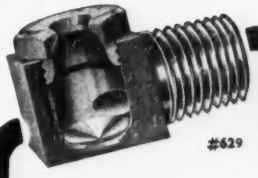
Presented on a commercial basis for the first time is frozen cooked crab in the shell. Pacific Pearl Cannery, Ketchikan, Alaska, packs the cleaned and cooked ready-to-eat portions, equivalent to a whole crab, in a waxed cardboard carton and deep freezes them.

Though company only began operations in the past season, it is stated to have become the largest producer of Dungeness crabs on the Pacific coast, partly due to the unexplained absence of crabs in the waters off the Northwest USA.

Color Kit Has New Look

Violin-shaped bottles and color-coded plastic caps feature the redesigned combination kit of food colors

LESS CLOGGING WITH MONARCH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Wax Fruits
Rinse Vegetables
Powder Milk
Dry Eggs
Wash Filter Cake
Humidify
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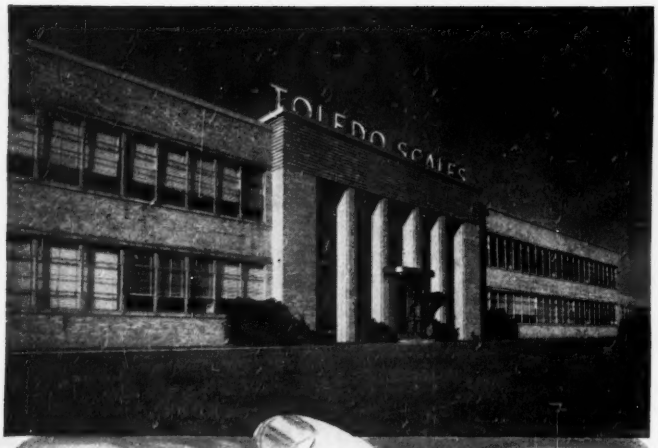

Ever weigh the advantages of investment protection?

TO anyone considering the choice of modern weight control, the name Toledo Scale needs no introduction. Their reputation has been established along lines of accuracy and dependability of product and they seek the same reputation in the products and services which they purchase. That's why *"Automatic" Sprinkler* fire protection was specified at the time construction of their modern Toledo, Ohio, facilities was initiated.

While the technical advantages of *"Automatic" Sprinkler* fire safety are of prime consideration, the financial aspects involved in this particular installation cannot be denied. The unsprinklered insurance rate for this seven million dollar valuated property would exceed $198,000.00 annually. The present *"Automatic" Sprinklered* rates are less than $6,000.00 annually, and fire protection in this case was paid for out of savings, in less than one year.

This is an excellent example of the manner in which *"Automatic" Sprinklers* convert an existing expense into a capital asset (INVESTMENT PROTECTION). It's substantial reason why business executives everywhere are ordering *"Automatic" Sprinklers* for both old and new construction. They look upon them as their first line of fire defense and recognize their value as *an important investment today . . . perhaps welcomed protection tomorrow.*

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
YOUNGSTOWN 1, OHIO

TYPICAL *"Automatic" Sprinkler* PROTECTED PROPERTIES

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"Automatic" FIRE-FOG
provides positive protection for severe fire hazards

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OFFICES IN PRINCIPAL CITIES OF NORTH AND SOUTH AMERICA

produced by R. T. French Co., Rochester, N. Y.

New bottles have sprinkler head, which allows addition of color drop by drop. The old window slit is eliminated, and colors are now indicated by printed strip in front. Owens-Illinois Glass Co. supplies the bottles.

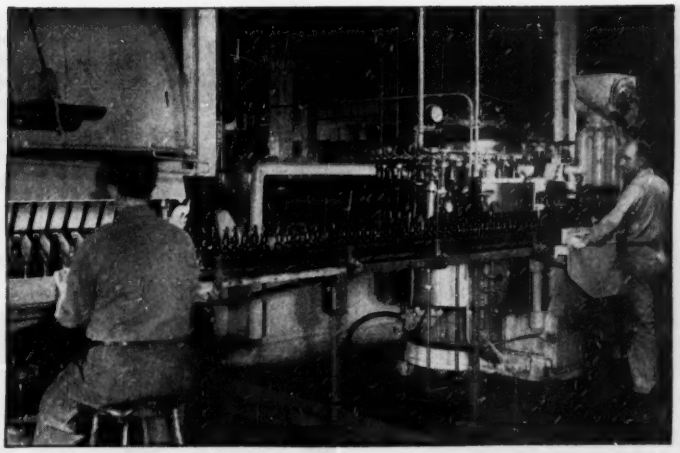
Marshmallows In Tin

New twist in marshmallow packaging is this hermetically sealed 10-oz. tin being used by Candyland Inc., Sioux City, Iowa. The product, it is said, stays fresher and can be stored indefinitely.

Although the tins do not give the "see-the-product" effect of the usual cellophane packages, they do a good job of eye-catching on the shelf and spell "sealed in quality" to the buyer. It remains to be seen whether the higher-cost tins will be justified by a sales rise.

Beer Gets "Top" Billing

Recently redesigned label of Red Top Brewing Co., Cincinnati, Ohio,



Link-Belt Flat Top Conveyor Chain is employed in this brewery to assure a smooth ride for beer bottles with uninterrupted delivery between Super National Bottle Cleaner and Vortex Pasteurizer, both manufactured by Barry-Wehmiller Machinery Co.

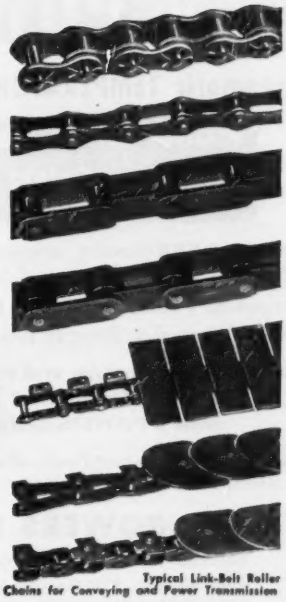
smooth, easy riding on

LINK-BELT FLAT TOPS

Link-Belt Flat Top Chains form the most dependable and even-riding moving highways for bottles, cans, jars and packages. They move them to and through washers, fillers, cappers and labeling and sealing machines—smoothly and efficiently.

The line of Link-Belt Precision Steel Roller Chains includes top plates of many shapes and sizes to suit a wide range of applications. Furthermore, chains are available which will negotiate curves in either horizontal or vertical planes or bend both ways with a single strand, which permits any conceivable path of travel to be accommodated. The hardened teeth of all sprocket wheels furnished to engage these chains are precisely cut and indexed to insure smooth chain and wheel action.

Your nearest Link-Belt office will be pleased to furnish reliable recommendations regarding Flat Top Conveyor installations.



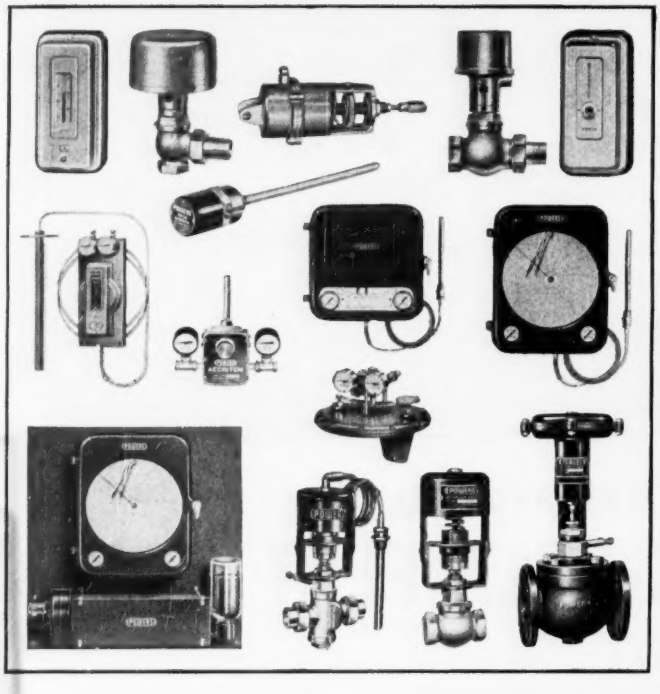
Typical Link-Belt Roller Chains for Conveying and Power Transmission

LINK-BELT
PRECISION STEEL
ROLLER CHAINS
AND SPROCKETS

THE SYMBOL OF QUALITY LB LINK-BELT

LINK-BELT COMPANY 12,170

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Johannesburg. Offices, Factory Branch Stores and Distributors in Principal Cities



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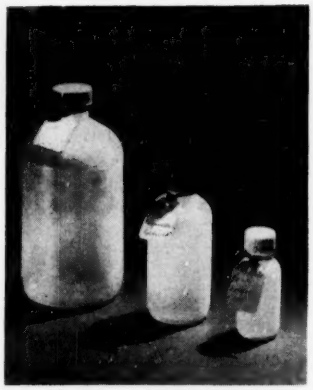
MEXICO, D. F., Edificio "La Nacional" 601 (HAP)

employs as its dominant symbol and trademark a bright red spinning top.

Company is placing this label on all its beer products, and is also playing up the top trademark on shipping cartons, billboards, black and white advertising and delivery trucks. Jim Nash, New York City, did redesign.

Background of the new label is white, circled in gold trim. Lettering is maroon, except for the word "Beer," which is in bright red.



'Poly' Bottles Help in Lab

These unbreakable polyethylene bottles are being used by Stephen F. Whitman & Son, Inc., Philadelphia confectionery firm, to supply its cooking departments with controlled amounts of flavors and colors.

Big advantage is the elimination of all glass breakage. Different colored caps can be used to classify contents of the bottles. Manufacturer is Plax Corp., Hartford, Conn.

Package & Product Shorts

Cheese in Colorful Flower Pots

Canadian cheese manufacturers are making a big effort to increase domestic sales and have decided attractive packaging is one way to do it. Latest plan is cheese in colorful flower pots. Other containers that have a re-use value are also being readied.

Cans Used for Salt Codfish

Newest innovation in line of Gorton-Pew Fisheries Co., Gloucester, Mass., is ready-to-eat salt codfish in 11½-oz. cans. The fish is already soaked and cooked, and just has to be heated. Salted cod in the usual cardboard carton sometimes spoils during very warm weather.

Butter Shortening

A new product designated as "Emulsified Butter Shortening" is being licensed to commercial bakeries by John A. Maas & Assoc., Cincinnati, Ohio. It contains 80 percent top-quality butterfat and a mono-glyceride as emulsifier. Manufacturing process is approved by F&DA, according to the American Butter Institute. —End

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Dept. FG-12, Decatur, Ill.

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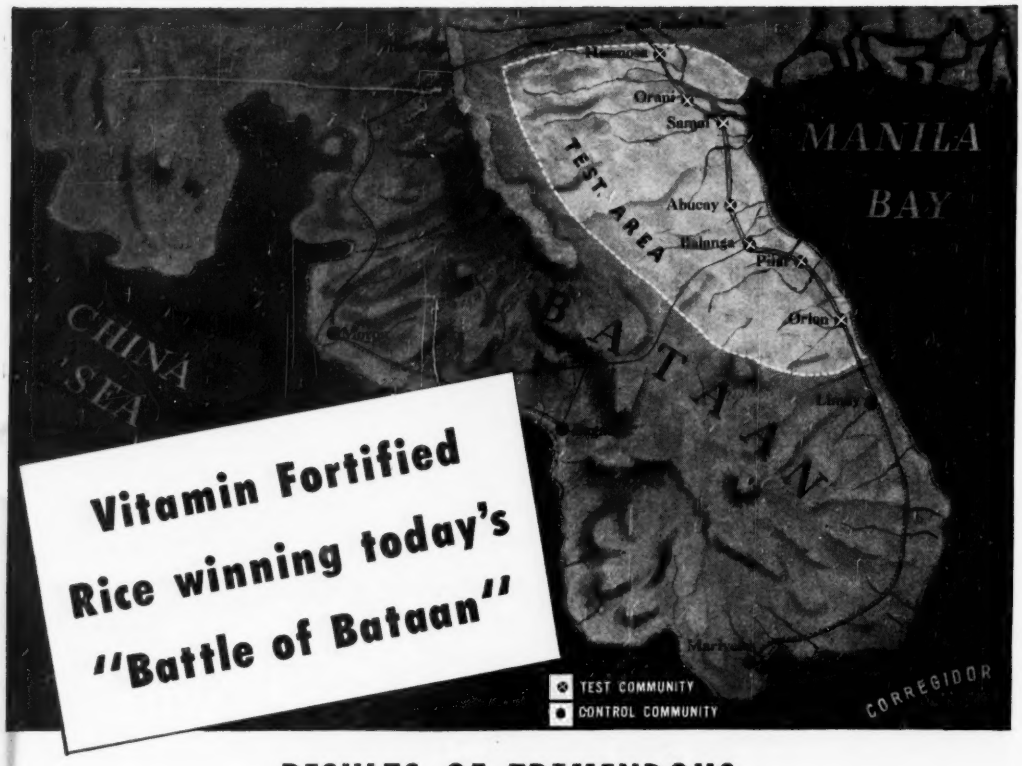
☐ Have your Flavor Expert call on me.

*Name*_____ *Title*_____

*Company*_____

*Address*_____

*City*_____ *State*_____



RESULTS OF TREMENDOUS NUTRITIONAL EXPERIMENT USING VITAMIN ENRICHMENT

★ Symptoms of 2nd most fatal disease reduced 70%

★ Beriberi deaths steadily falling

In an experiment in the Philippines now involving over 90,000 persons, conducted with the approval of the Philippine government and medical associations, and in which Hoffmann-La Roche is proudly cooperating, remarkable health benefits from rice enrichment have been demonstrated. This is reported by Juan Salcedo, Jr., M.D., M.A., Director of Nutrition, Institute of Nutrition, Manila, P.I.

With rice the principal food, and beriberi the No. 2 cause of death, this new "Battle of Bataan" was planned and waged to determine whether enrichment of rice would reduce the incidence of beriberi. Bataan Province was selected because of its high beriberi mortality and because rice traffic could be readily controlled there. (Early investigation showed enriched rice completely satisfactory in taste, color, odor, palatability and digestibility.)

*"There are indications from raw data available from the present clinical beriberi resurvey that the beriberi incidence has been reduced by 70%."**

Beriberi mortality rates have also steadily dropped in the "enriched rice" area without significant change in the control area.

★ Infantile beriberi virtually eliminated

This dramatic and specific evidence of the benefits of vitamin enrichment should have a vital effect in improving the health of peoples all over the world.

WHAT THIS MEANS TO YOU

While this experiment concerned white rice, it proves the benefits to public health through enriching white bread and rolls, family white flour, and other processed cereals. Any miller of wheat, rice, or corn—any baker—any macaroni and noodle manufacturer, who is not now regularly enriching his products may well ask himself if he can any longer afford to withhold such extensive health benefits from his share of the consuming markets.

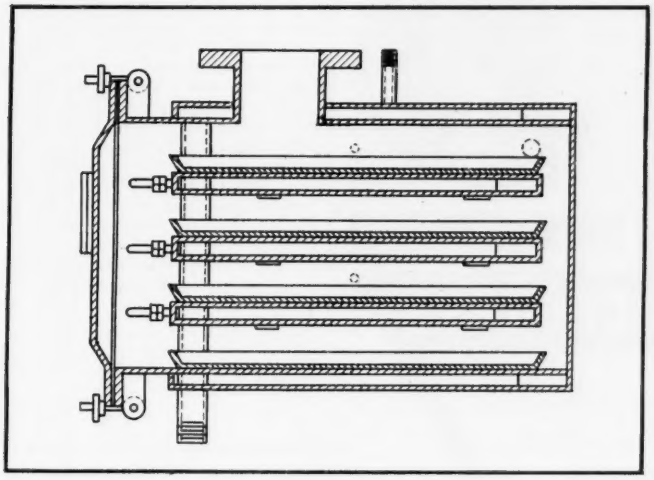
*Quotation from latest of published interim medical reports. *Write for reprint.*

ROCHE

VITAMINS FOR ENRICHMENT

VITAMIN DIVISION • HOFFMANN-LA ROCHE INC. • NUTLEY 10, N. J.

New Technology



Fruit Juices Desiccated by New Process Have Improved Keeping Qualities

Production of desiccated fruit juices, coffee extract, and other aqueous alimentary extracts, at substantially reduced cost is the object of a recently patented process and apparatus.

The juice or extract is preconcentrated to 1/7—½ its original volume by appropriate means then placed in trays and subjected to a vacuum of 50—2,500 μ (in the chamber illustrated above) whereby the water present is converted to vapor. During initial stages of the operation, temperature of the product is kept below 32 F. (usually between -2 and -20 F.) by means of a cold medium circulated through spaces in the jacket and shelves of the vacuum chamber.

During the drying operation the material softens and becomes plastic in nature. It puffs in the trays, producing a greater area for evaporation which speeds the drying process. Toward the end of the operation, temperature of the material is increased to 140-150 F. to insure reduction of moisture content to 0.2 percent or less. While still hot, the material is transferred to suitable containers and sealed for storage or distribution.

It is claimed that, when stored in sealed containers at appropriately low moisture contents, dried products made by this process will keep for long periods and, when reconstituted by addition of water, will make a product which is substantially the full equivalent of fresh material.

Digest from U. S. Patent 2,509,681, issued May 30, 1950, on an application dated Jan. 10, 1946, to E. W. Flosdorf, Forest Grove, Pa., assignor, by mesne assignment, to Tabor-Olney Corp.

Acid-Detergent-Dye Bath Improves Orange Color

Novel procedure for enhancing the color of citrus fruit which, though ripe, has off-color skin, is disclosed in recent patent specifications. Method differs from the present one in requiring lower bath temperature, and in replacing soap with a surface active agent of cationic type that suspends the dye in such finely divided particles that its entrance into the peel is greatly facilitated. The bath comprises an organic amine salt solution mixed with an oil-soluble dye, diluted with water. Suitable amines must have at least one hydrocarbon chain of not less than 10-20 carbon atoms. A list of suitable compounds is included.

By way of example the following procedure is given: Mix 1 lb. of dispersible, edible, oil-soluble dye (Food, Drug & Cosmetic-Red No. 32) and 18 lb. AM-Coco-B. Heat and stir to obtain a suspension of the dye and add water to form 20 gal. This is further diluted with water, 25:1, to form the bath in which the citrus fruit, particularly oranges, is treated, at a temperature of 110 F. for a period of 4 min. Inasmuch as the bath is acid in reaction, only 0.2 percent fungicide is used in contrast to as much as 1 percent in the alkaline baths that were used in the past.

Digest from U. S. Patent 2,503,664, issued to C. E. Gericke, Puerto Castilla, Honduras, and assigned to American Machinery Corp., Orlando, Fla.

DAIRY

Concentrated Milk Product

Production of a new plastic milk product of spreadable consistency, which contains substantially all the food substances in natural fresh milk, is the goal of a recently patented process. Prior efforts to produce such a material by eliminating sufficient water to increase viscosity have had the effect of allowing the lactose to crystallize and impair the quality of the product. It has now been discovered that excellent plasticity is obtained when total solids, including fat and non-fat, amount to 50 percent of the weight of the product.

Thickening of the product to the desired viscosity is accomplished by adjusting the butterfat content to the solids-not-fat in the ratio of 1:1, and subjecting the entire product to homogenizing action, with the addition of a

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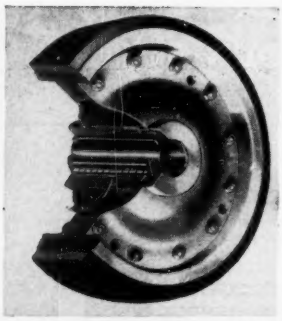

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water binding agent such as carob bean and other gums.

By way of specific example, milk of about 12.5 percent solids is concentrated in a vacuum evaporator until the solids content is practically 51 percent by weight. Sufficient butterfat is then added to raise the ratio of butterfat to solids-not-fat to about 1:1. Carob bean gum is added to the extent of 0.1 percent by weight. The mixture is heated to 175 F. for 1 min. and homogenized at this temperature. The product is free from cooked flavor, has good keeping qualities at refrigerating temperatures, and resists substantial change in viscosity through the temperature range usually encountered in storage and use. Other ingredients may be added at any desired stage of the process.

Digest from U. S. Patent 2,501,445, issued Mar. 21, 1950, on an application dated July 25, 1946, to W. H. Hoecker and B. W. Hammer, Orinda, Calif., assigned to Golden State Co., Ltd., San Francisco.

Increasing Amount of Lactose Improves Ice Cream Quality

Improvement in body and flavor of ice cream is claimed for a patented process in which the relative quantity of lactose in the mixture is increased, with or without making a corresponding decrease in the relative quantities of other milk solids not fat. The method may be practiced by separating skim milk solids and adding the individual components as desired.

Thus, an ice cream normally containing 9 percent skim milk solids may be changed to include 7 percent skim milk solids and 2 percent lactose, which yields a product of superior characteristics without any tendency of lactose to crystallize and impart a sandy texture to the ice cream. In the improved formula, lactose content is increased by nearly 1 percent of the total weight of the ice cream, with equivalent reduction in proteins and mineral salts. The ratio of lactose to all other milk solids not fat is 1.73:1, which is greater by 53 percent than the corresponding ratio in skim milk solids. Examples are given of the application of the discovery to ice creams containing fruit, and to ice creams based on various formulas.

Digest from U. S. Patent 2,500,315, issued Mar. 14, 1950, on an application dated Jan. 16, 1946, to Carl F. Koerver, Brooklyn, N. Y., and assigned to The Borden Co., New York City.

Composition May Not Be Clue To Adulteration of Milk

Low-solids milk is not necessarily an indication of adulteration by watering. Indeed, milk of this character has long been a problem on New England dairy farms where dairymen

SOLVAY

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QUALITY PRODUCTS for FOOD PLANT CLEANING

Solvay offers you a superior line of cleansers for the food plant. Whatever your needs may be, you may be sure that there is a Solvay cleaning product to fit them. You may be sure, too, of the quality of these products . . . for Solvay is America's first and oldest producer of alkalies and associated chemicals. For cleansers of dependable quality, specify Solvay.

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A brand new cleanser of the 600 series, Cleanser No. 615 provides more detergent action for more difficult cleaning jobs. Specially developed for hard water, this product substantially cuts cleaning costs in these areas.

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Solvay's new, exclusive wetting agent-detergent. Not an alkali, not a soap, not a mixture. Exceptional detergency and rinsability—in hot or cold, hard or soft water—combined with mildness and safety give Nytron a wide variety of uses in the food plant. It will not dull painted or polished surfaces . . . use it for regular cleaning of equipment, floors, walls, windows, trucks, etc.

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9 ACE ALKALI

Solvay's brand new bottle washing cleanser. A premium product for premium performance . . . Ace Alkali produces exceptional results in the most difficult bottle washing operations and with the hardest water.

10 SPECIAL FLAKE ALKALI

For hydro and spray type bottle washing equipment, where foaming is a problem, specify Solvay Special Flake Alkali for best results.

for Heavy Duty Cleaning

11 CAUSTIC SODA

A basic alkali from America's oldest and largest producer. High pH and high neutralizing value give Solvay Caustic Soda "bite" that will do the most difficult cleaning jobs with highest efficiency.

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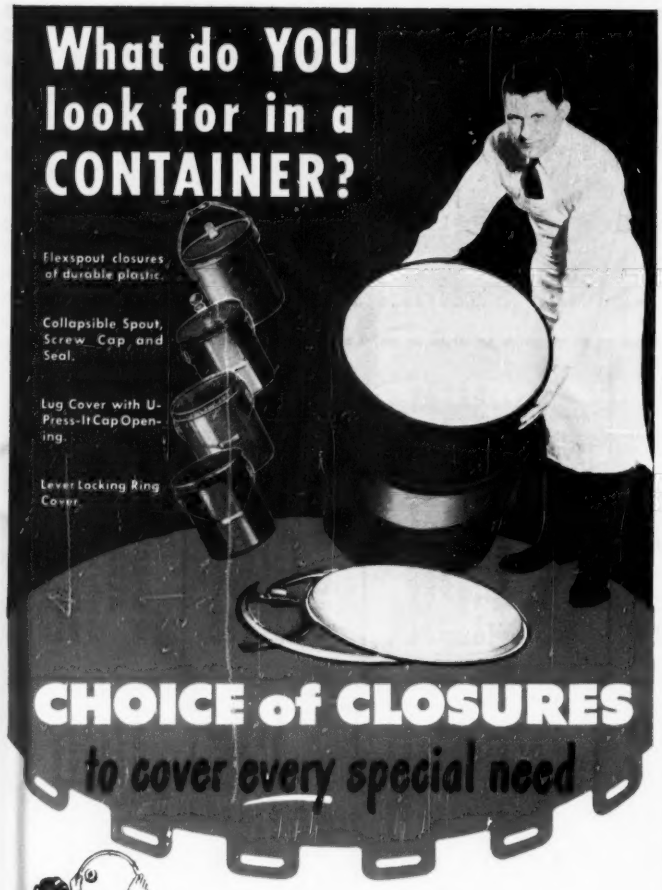
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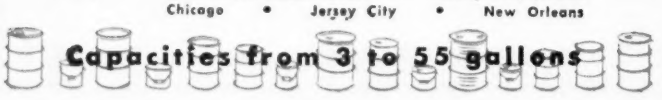


Capacities from 3 to 55 gallons

have not only had to accept low prices for their product on account of its low solids content, but have been unjustly accused of adulterating their milk with water. An investigation was made of the milk from a university dairy herd. Data on fat and solids-not-fat had been accumulated over a period of several years, and no question of adulteration could arise. Results showed that many cows and herds do produce milk having an abnormal relationship of fat to solids-not-fat.

One hundred and thirty samples were analyzed for percentage butterfat and total solids by the Mojonnier method, and for butterfat by the Babcock method. Determinations were made of the refractive index of the acetic serum, sour serum, and copper serum; also of the serum ash and freezing point depression. All samples showed a normal freezing point depression, indicating no adulteration with water. Ten of the samples had refractometer readings indicating added water. Average solids-not-fat of these 10 samples was 7.66 percent. Another group of 12 samples with an average solids-not-fat of 7.86 percent did not indicate added water according to the refractometer readings. The conclusion is reached that it is possible to obtain low refractometer readings on unadulterated milk samples having a low composition solids-not-fat.

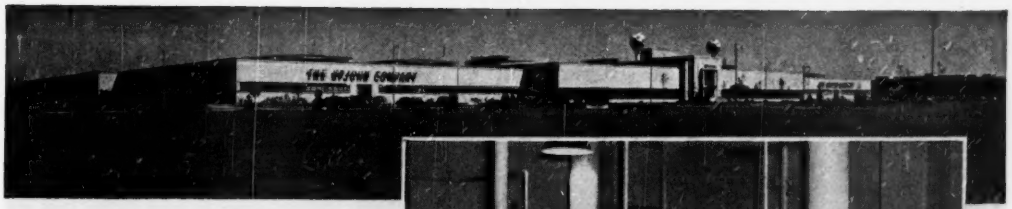
Digest from "Relationship of Composition of Milk to Methods Used for Determining Adulteration," by H. C. Moore and A. E. Teeri, *Journal of Milk and Food Technology*, Vol. 13, 203-05, July-August, 1950.

BAKING

Bakery Sanitation

Eighty percent of bakery sanitation is concerned with good housekeeping and adequate maintenance of the plant. The remaining 20 percent of effort is applied to the preventive program, which includes rodent-trapping and the use of insecticides of the residual-deposit type for the purpose of catching casual invaders.

Given a rodent-proofed and screened plant with proper storage facilities there is no excuse for development of insect or rodent infestation unless poor housekeeping is followed. First consideration is the routine removal of flour dust deposits which form everywhere within the bakery. This can best be done with an industrial vacuum cleaner. Second is cleaning the equipment, both inside and outside. The former has been difficult due to faulty design that made disassembly impossible. Third is personal hygiene,



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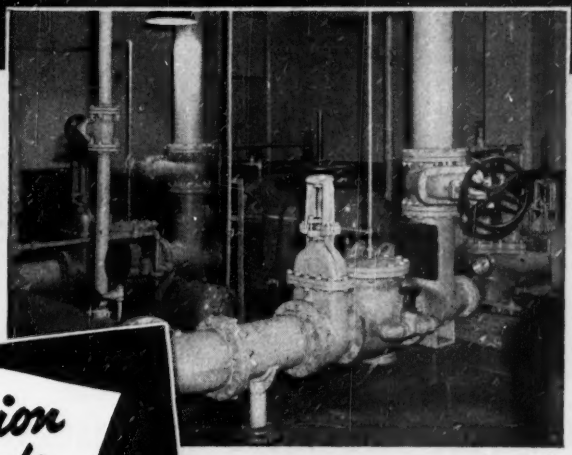

An installation of 12-inch OIC gate valves in the ultra-modern UPJOHN plant at Kalamazoo, Michigan.

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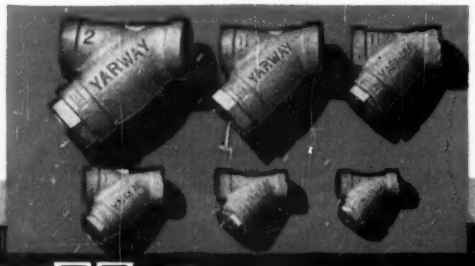


YARWAY STRAINERS
"Police the Pipelines"

among employees. This can be helped by providing adequate facilities for employees to keep themselves clean, and by properly informing them of their obligations to report individual sicknesses.

It has been observed that a noticeable infestation of either rodents or insects will be built up by casual invaders multiplying in some hidden spot not disclosed by ordinary surveillance. Preventive sanitation programs properly applied automatically catch these casual invaders as they attack the plant.

Digest from "What To Look For In Bakery Sanitation Appraisal," by E. L. Holmes, *Journal of Milk and Food Technology*, 303-7, Sept.-Oct., 1950.

MICROBIOLOGY

Microorganisms Remain Viable In Raw Milk Cottage Cheese

Cheese will continue to harbor *Mycobacterium tuberculosis* for periods up to nearly a year in Tilsit and some hard cheeses made from skim milk, and for 5 to 50 days in such types as Emmenthaler, Gruyere, Camembert and Munster. Some lactic acid streptococci have been found to produce antibiotics active against *M. tuberculosis*, and it was hoped that cottage cheese, made with the aid of these streptococci, might be rendered free of *M. tuberculosis* organisms.

Cottage cheese was prepared by souring pasteurized skim milk mixed with tuberculosis infected milk, using a mixed lactic acid streptococcus culture. Tests were made on guinea pigs after different storage periods. Results showed that the cottage cheese contained viable tuberculosis organisms for 17 days after making, even though proteolysis was evident after 10 or 12 days, and had reached the ammoniacal stage by 12 days. There is, therefore, no indication that streptococcus souring of milk for cottage cheese making will destroy *M. tuberculosis*.

Digest from "The Virulence of *Mycobacterium Tuberculosis* in Cottage Cheese," by Loncin and J. Geairain, *Revue des Fermentations et des Industries Alimentaires*, Vol. 5, No. 3, 92-4, June, 1950.

Mysterious Sugar Losses Due to Thermophiles

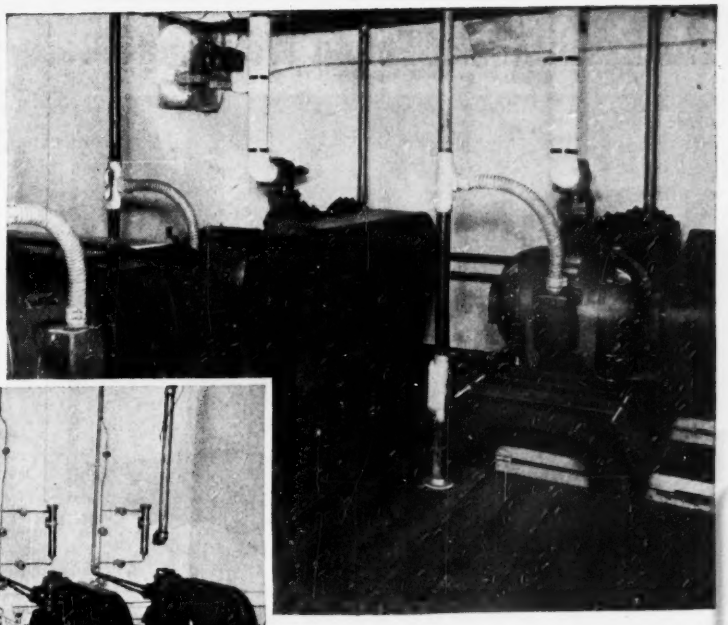
Many instances of undetermined losses of sucrose in either raw cane sugar manufacture or refining may be attributed to thermophilic bacteria.

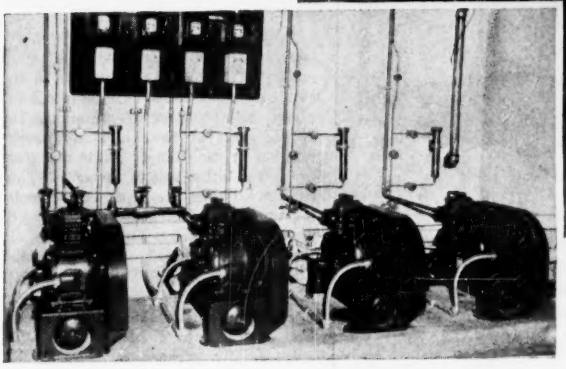
Recent research has shown that thermophilic bacteria can cause relatively rapid destruction of sucrose in the presence of boneblack or activated carbon. In parallel experiments with

LARGE
installation

or

SMALL . . .





Typical of smaller units used in food stores are these four General Electric machines.

Large General Electric installation includes three compressor units to provide refrigeration for fruit storage.

in the frozen food business, be sure to use "Freon" safe refrigerants

To guard against food contamination and spoilage, it's essential that your air conditioning or refrigeration installation be as safe and dependable as possible.

And one sure way to get the utmost protection and efficiency is to select air conditioning and refrigeration equipment designed to use "Freon" refrigerants.

"Freon" refrigerants are as pure as modern methods of manufacture can make them. They're nontoxic, nonexplosive and nonflammable... harmless, tasteless and practically odorless. Even if leaks should develop, "Freon" refrigerants won't contaminate food. And since they contain no acids, "Freon" refrigerants won't corrode or otherwise harm equipment.

In fact, the exceptional dryness of "Freon" greatly reduces the risk of "freeze-ups" and provides protection against the formation of abrasive sludges—actually helps prevent equipment breakdowns.

When you plan your next air conditioning or refrigeration installation, think of these many advantages. Then be sure you get maximum safety and economy. Select only equipment designed to use "Freon" refrigerants.

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EXACT WEIGHT Scale Model #213-S, the most popular consumer packaging scale—Features (1) high speed operation due to extremely short platter fall, (1/8") (2) end tower construction which takes up less bench space, and permits, uninterrupted production across the scale while commodities are being weighed all in direct line of vision, 1 lb. beam, notched type. Dial 1 oz. over and under x 1/4 oz. graduation—Capacity to 3 lbs.

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sugar solutions heated to 132 F. and inoculated with thermophilic species of bacteria, samples containing boneblack or activited carbon underwent rapid loss of purity, in marked contrast to those not so treated.

Digest from a paper by W. M. Owen, Baton Rouge, La., presented before the Div. of Sugar Chemistry, ACS., Houston, Tex., March 27, 1950.

CONFECTIONERY

Confections Packaged In Flexible Sheet

Designed to eliminate paper cups, partitions, cushions, and even the box used in packing candies and bonbons, a patented method of packaging uses merely a sheet of cellophane or like material. Confections are dipped in an edible substance, such as chocolate, and placed on the sheet of cellophane in spaced parallel rows and in spaced relation to each other. Wide margins are left at either side of the sheet. The candies are then passed through a cooling tunnel in which they are dried and rendered non-sticky. Opposite sides of the sheet are folded over the middle portion carrying the confections, and the folded sheet is then rolled from one end to the other in such a manner that each individual row of candies is substantially encased by portions of the sheet. To facilitate proper spacing of the candies on the sheet, it may be marked to identify the type or kind of candy; or it may be provided with embossed indentations for retaining them in spaced relation.

Digest from U. S. Patent 2,505,384, issued Apr. 25, 1950, on an application dated May 31, 1945, to Jack Burstiner, New York, N. Y.

CANNING

New Fish Canning Process Employs Infra-Red Blanch

Using the principle of infra-red radiation, a new method of preserving fish by canning has been developed by Hartmann and Pawlowski of Germany. The unique character of the invention is a continuous blanching operation applied in accordance with the ray depth effect of the arc ray receiver. The rays of the invisible spectrum cook the fish from the inside out, extracting superfluous cell water and causing desired shrinkage.

In practice, fish are scaled, cut the length of the club size can, pickled to supply the required salt, dried, and packed in containers. Latter are then placed on flat tin boxes and covered with a perforated tin lid. Containers

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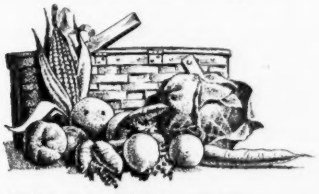
Nobody turns a deaf ear to a dinner bell. Everybody knows it means food. But—not everybody realizes how much the food industry does to make America's dinner bell mean that this country is the best-fed and best-nourished in the world . . . To this accomplishment in food, Monsanto chemicals contribute much. Their use by the food industry covers a wide scope—insures better harvests, greater beef and dairy yields, improved processing, higher sanitation, lowered costs, increased sales appeal.

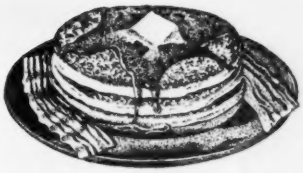


fruits, vegetables, grains

One of the most potent Monsanto insecticidal chemicals for increasing wheat, apple and citrus fruit yields is Niran*—Monsanto's parathion. It is very toxic; must be formulated, handled and applied with great care . . . Nifos*-T, another Monsanto insecticidal chemical, is used in formulations for the effective control of aphids and mites that attack vegetables and fruits. It is very powerful in weak solutions—has negligible residual toxicity . . . Santobane*—Monsanto's DDT—is widely used in formulations to stop corn borers . . . Larger crop yields result from applications of 2,4-D formulations to weedy grain fields.

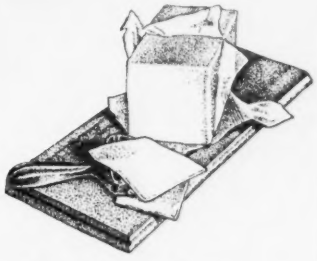
ice cream, cake, confections

Many foods derive much of their tempting taste from Monsanto products. Fluffier, lighter cakes result when cake flours contain Monsanto phosphates. The richer flavors of icing and ice cream are contributed by Ethavan*—Monsanto's vanilla-like flavoring principle used by extract manufacturers. Vanillin is another Monsanto flavor principle. So is methyl salicylate, with its wintergreen flavor.



pancakes, doughnuts, muffins

Uniformity in prepared flour mixes is assured by the use of Monsanto acid leavening phosphates. Pancakes, for instance, are always tender and crisp—the last batch is just like the first. Self-rising flours are also improved by the use of Monsanto phosphates—they contribute nourishment in addition to better baking properties. Phosphoric acid is still another Monsanto food-use product.



cheese, dairy products

Cheese processors use Monsanto phosphates as emulsifiers . . . Another Monsanto product, used by formulators of dairy cleaning compounds, is Santomerse* No. 1. It is a detergent with powerful cleaning and free-rinsing action; promotes sanitation.

more information

Manufacturers of foods and food products are invited to contact Monsanto for more information on products that will help them in any phase of their operations. Check and return the coupon, or write Monsanto Chemical Company, 1737L South Second Street, St. Louis 4, Missouri. In Canada: Monsanto (Canada) Limited, Montreal and Vancouver.

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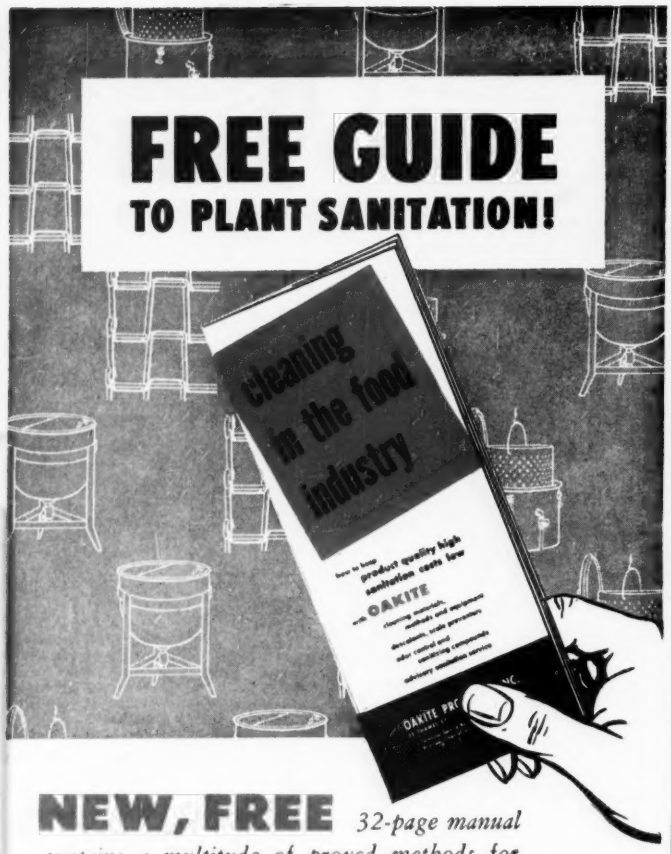

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If you're looking for ways to stretch your cleaning dollar, investigate specialized Oakite cleaning compounds, modern Oakite manual and mechanical cleaning methods. You can count on getting the best that money can buy. You can count on getting real, live, on-the-spot service from a man who knows cleaning . . . knows where and how to cut cleaning corners. Yes, for "Stem-to-Stern" sanitation consult Oakite—first.

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are placed on an endless chain belt that passes through the tunnel-like infra-red ray apparatus, which is about 16m. long. Passing through the radiation zone, where final temperature is about 170 deg. C., cell water leaves the fish and collects in the bottom of the containers. As the belt continues to move the containers are inverted and the water drains from them. At the end of apparatus, containers are removed and placed on another endless belt where they are filled with oil at a temperature of 70 deg. C. After passing through an automatic sealing machine, containers are conveyed to an autoclave where they are sterilized. Capacity of the apparatus is 50,000 cans in 8 hrs. The finished product is said to be of excellent quality in flavor and aroma, with undamaged skin.

Digest from "New Processes in the Canning of Fish," *Foreign Commerce Weekly*, 37, July 3, 1950, translated from *Die Fischwaren und Feinkostindustrie*, Feb., 1950.

MISCELLANEOUS

Cleaners and Sanitizers In the Food Industry

In an extensive survey of chemical cleaners and santizers useful in food factories, including a bibliography of 136 references, enough detailed information is given to enable a food manufacturer to select detergents and sanitizers to cope with his special conditions. The complex nature of "soil," as used in the field of sanitation, is discussed, and conditions favorable to the growth of microorganisms are outlined.

Listing the numerous functions of detergents, it is pointed out that they vary widely in their ability to accomplish some of the objectives, which is why a good cleaner is generally a mixture of several chemicals. Detergents are classified and tabulated: Acids and alkalies; acid, neutral, and alkaline salts; synthetic organic compounds; and a miscellaneous group. A separate table lists the important phosphate detergents with their formulas, and chemical and trade names. Of the synthetic detergents, special attention is given to chemicals in the anionic group which are tabulated and classified. Finally, there is an alphabetical list by industries of a variety of applications for detergents, with references to the original texts.

Sanitizing, which has for its purpose the destruction of microorganisms not removed by cleaning operations, is accomplished with an entirely different group of chemicals which must meet quite different requirements. Nontoxicity, high germicidal potency, free-

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A LETTER TO US . . . describing your requirements will bring you a careful analysis of this area's advantages as they apply to your business. Or, if you wish, we will send you a carefully screened list of the available buildings or sites that would be suitable for your operations, based on the information you give us. We keep all such inquiries confidential. Just write us.

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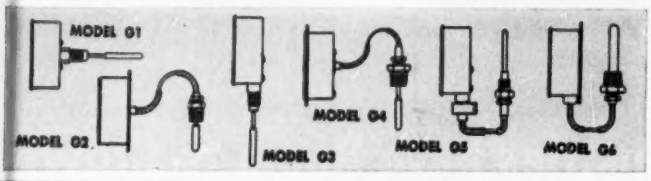

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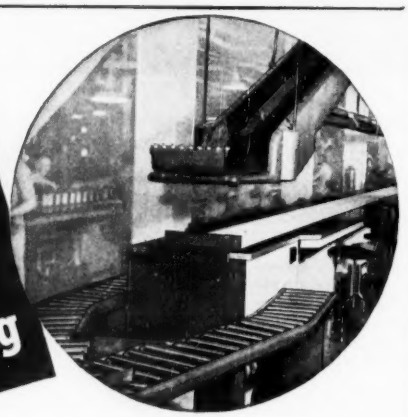

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dom from objectionable color and odor, non-corrosiveness, effectiveness at low temperatures, and stability during storage. Extended discussion is given to quaternary ammonium compounds, chlorine and its compounds, and air sanitizers. Tabulated data are given on the first two groups, showing the chemical name, structure, and trade name of the sanitizers.

Digest from "Sanitation in the Food Industries, With Special Reference to Chemical Cleaners and Sanitizers," by C. G. Dunn, *Wallerstein Laboratories Communications*, Vol. 13, 121-38, **June, 1950.**

New Type Malt Kiln

Fans blowing heated air through the malt, rather than pulling the air through it, or natural draft, are features of malt kilns which have come into use in Germany since the war. One advantage is a saving in construction costs, since a high stack for natural draft is not required and a building about 40 ft. in height is ample. Capacity of the kilns is about 50 lb. malt per sq. ft. of drying surface with a green-malt layer 23—32 in. in depth.

A typical installation has a coke-fired furnace on the ground floor with an air-supply duct for the fire leading to the outside air as well as to the top floor of the kiln. A fan on the floor over the furnace blows the gases into an equalizing pressure chamber below the malt layer. Baffles and louvres distribute the air so that it flows through the malt layer evenly. The green malt is spread out on a perforated floor, and is not disturbed or stirred during the drying.

Through the duct leading from the kiln floor to the furnace as much air can be recirculated as the type of malt being dried may require. Controls consist of thermometers and thermostats. The latter are placed in the pressure chamber and over the drying malt. They actuate regulators controlling the admission of outside air over the fire so that temperatures are kept constant during the successive drying stages. Normal time in the kilns is about 18 hr.

Malt from these kilns is likely to be lighter in color than other malts, due in part to the bleaching action of SO_2 from the coke fires. For the same reason it often yields worts of slightly lower pH (0.1 unit). Its moisture rarely exceeds 2 percent, and its bushel or hectoliter weight is likely to be less than other malts. Kilning loss, judged by the 1,000-kernel weight, is about the same as for other types of malt-drying and the extract yields of the malt are normal.

Digest from "High Capacity Kilning," by Hans Leberle, *Brauwelt*, No. 29, 605-10, July 20, 1950. —End

Now old King Cole
was a merry old soul
a merry old soul was he
he called for his pipe
and....

He called for his bowl

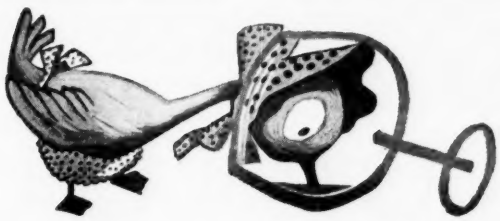
... filled to the brim with sparkling rich wine or foaming ale. Like King Cole, millions of Americans have found the products of the alcoholic beverage industry a real addition to their daily diet, making Beer and Wine one of the fastest growing of the mighty FOOD PROCESSING INDUSTRIES.

ALCOHOLIC BEVERAGES... a large and growing field with $2.6 BILLION a year production value, but still part of the vast $33 BILLION FOOD PROCESSING BUSINESS ... and breweries and wineries have processing interests and problems common to the rest of this tremendous field.

For... FOOD, with its 40 thousand plants and multitude of end products is one industry. It is the largest single market for industrial equipment, materials and supplies in the U. S.... and all its branches have the same basic operations, utilizing similar methods, equipment and materials.

The brewer and vintner, the canner and baker, read FOOD INDUSTRIES, most quoted and most used food journal in the world. For, FI is the only magazine that keeps them abreast of what other plants are doing in all branches of the food field... every issue carries practical new ideas for profitable processing.

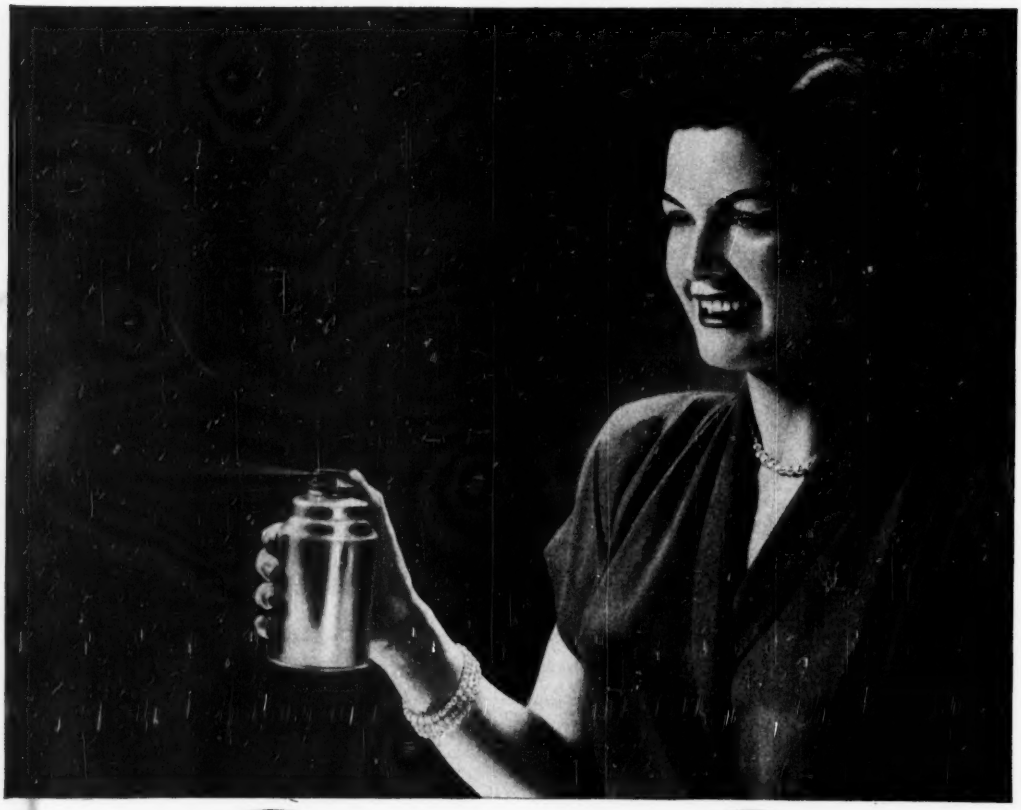
FOOD INDUSTRIES gives them ideas for cutting costs, speeding production, and improving processing, packaging, and materials handling. And... the Food men that buy read FOOD INDUSTRIES... advertising in FI carries your message to the real buying influences in Food plants.



Food Industries

A McGRAW-HILL PUBLICATION

CROWN SPRA-TAINER



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Food Industry News

Labor Law Limits for Food Plants Finally Set Up by the NLRB

Much of the doubt that has existed as to when the National Labor Relations Board would use the Taft-Hartley Labor Law in a dispute involving an employer in the food industry has been eliminated. NLRB has announced a set of yardsticks that it will use in measuring whether the impact of your business on interstate commerce is sufficient to warrant application of the federal labor law.

This is of particular importance to the food industry because so many of the operations are largely local, even though materials purchased and some sales may cross state lines.

Until last month, NLRB would not assert its jurisdiction over a business that affected commerce if it was "essentially local in character." (FI, August 1950). But it had no definite measure of what was "essentially local." This left many employers and unions in doubt as to whether they could get NLRB to hold an election or prosecute unfair practice charges.

Board Inconsistent

The uncertainty deepened whenever the Board changed its mind. Recall how the Board declined to hold a decertification election among employees of Sta-Kleen Bakery, Lynchburg, Va., because it considered the company's operations to be "essentially local" (FI, November 1949). Sta-Kleen in a year bought $428,000 worth of materials from outside the state and sold $900,000 worth, all in the state.

Yet the Board later took jurisdiction over a dispute involving McGough Bakery, Birmingham, admitting that it was inconsistent with its earlier position in the Sta-Kleen case (FI, October 1950, p. 135). McGough Bakery bought $650,000 in materials from outside the state, and all of its $5,000,000 sales were made in the state.

Under its new policy, the Board would not assert jurisdiction over either of those companies unless they sold a substantial amount of baked goods to industrial plants or other companies over whom it has taken jurisdiction.

The policy was set forth in a series of decisions in which the Board outlined the tests it would apply. First, the business must have at least some "affect" on interstate commerce. Then it must meet one of these further tests:

1. Be part of a multistate enterprise or operate as a chain store or branch of an international or interstate organization. (The decision which set this policy involved Borden Co.'s Houston plant. The Board took jurisdiction because even though the company is locally managed and sells its entire output within the state, Borden is a nationwide company.)

2. Produces goods for out-of-state worth at least $25,000 a year.

3. Provides at least $50,000 of materials a year for the operation of a business subject to the Taft-Hartley law.

4. Gets an indirect inflow of $1,000,000 of goods from outside the state, or a direct inflow of $500,000. (A decision involving Federal Dairy, Providence, R. I., set this policy. NLRB refused to take jurisdiction because the direct inflow of milk and supplies was only $400,000.)

5. Or if the combined percentage of inflow and outflow (based on the four dollar amounts) equals at least 100. For instance, Federal Dairy had an inflow of $400,000 in goods. This is 80 percent of the $500,000 minimum required. It had no direct inflow of goods, no out-of-state sales and did not sell to any firm engaged in interstate commerce. If it did any of these things to the extent of 20 percent of the minimum sales specified, the Board would take jurisdiction because the 20 percent and 80 percent add up to 100 percent in any tabulation.

Libby, Pictsweet Unite Distribution Forces

Libby and Pictsweet join distribution forces on the West Coast with the amalgamation of the two largest distributors in Oakland, Calif. They are Frozen Food Distributors, Inc., and Select Foods, Inc. Amalgamated name is Ferguson-Langfield Frozen Foods, Inc. The new firm will feature Libby's frozen foods, along with Pictsweet, Prime Froz-n, Donald Duck and Flowing Gold orange juices, Ocoma and Swanson chickens, and specialties. While all lines may not be retained, the wide range recognizes grocers' varying brand and price preferences as dictated by consumers.

Reason for amalgamation is consolidation of sales volume to reduce operation costs. Also, and at least equally important, recent moves by Birds Eye and Snow Crop to circumvent wholesale distributors, especially evident in Los Angeles market by selling direct to chains and supermarkets, painted a disturbing picture for the two firms individually.

Baking Institute Center

Dedicated during the annual meeting of the American Bakers Assn., the new American Institute of Baking center was visited by more than 1,000 bakers on October 15. The school bake shop will be housed in the white building on the right, with class rooms and offices in twin building to left. AIB research bake shop takes up the well-glassed center portion. Center's cost was declared to be $1,250,000.

Nabisco Starts Building Huge New Bakery

National Biscuit Co. has begun construction of a $28,000,000 cracker and cookie bakery on a 50-acre site in Chicago. Reported cost includes land, building, and equipment.

The building is to be one-story and is purported to house the largest bakery in the world under one roof. Excavation work started Nov. 1, and the structural steel is being fabricated. Ragnar Benson, Inc., Chicago, is the general contractor, with March, 1952, set as the date for completion.

Partial production operations will be started in the plant upon completion of the building, although full operation is not expected prior to March, 1953. Operations in existing Chicago cracker and cookie plants of the National Biscuit Co. are to be moved into the new plant.

USDA Sees Food Business Good in '50 and '51

Profit totals this year will be better than 1949 for both food processors and retailers. And 1951 will be a good year too. So say USDA economists.

In a summary study released recently, USDA pointed out that in 1951 marketing margins for food are expected to be higher than in 1950. But, increases in marketing costs may prevent any rise in profits. Profits remaining after provisions for Federal taxes would be adversely affected by higher corporate taxes, and by an excess profit tax.

USDA found that profits in 1949 were lower for food processors but higher for retail food chains than in 1948. The ratio of operating profits (after Federal taxes) to investment for a group of 43 food processing companies declined from an average of 8.7 percent in 1948 to 7.7 percent in 1949. Profit ratios of 8 retail foodstore chains rose from an average of 15.1 percent in 1948 to 15.9 percent in 1949. USDA says available data indicate that profits for the first half of 1950 for both groups were higher than for the same period of 1949.

Profits of the baking industry have been quite unstable during recent years. The ratio of profits to investment for a group of 8 companies established a 15-year record high of 19.7 percent in 1946. This was followed by a ratio of 13.6 percent in 1947, 17.4 percent in 1948, and 13.1 percent in 1949. The ratio of profits to sales has followed a similar pattern.

USDA analysis of 1949 profits shows that not all food processors fared the same. Ratios of profits to sales in 1949 were lower than in 1935-'39 for all groups of food processing companies except the dairy-product firms, which were the same in the two periods. Profits-to-investment ratios, however, were higher for all groups except meat packers and canners. Some firms maintained their profits-to-investment ratios, in spite of reduction in profits-to-sales ratios, by increasing their volume of sales relative to investment.

Make Tomato Juice, Paste As Unfrozen Concentrate

Concentrated, unfrozen tomato juice and a more highly concentrated tomato paste now are being produced in a northern California cannery. Both products are processed in a specially designed Mojonnier Bros., low-temperature evaporator that in addition to vacuum, utilizes pressure to move the viscous fluid.

The tomato juice is first concentrated to 40 percent total solids then cut back, with fresh single-strength juice, to a 4 to 1 density. It is reconstituted in the same way as is concentrated frozen citrus juice. Besides having a superior flavor, when compared to the conventionally canned single strength juice, this tomato concentrate evidences a high degree of color retention. The usual terminal heat sterilization seems to have no effect on the color of the product.

Color is improved also in the concentrated tomato paste, which by this method, is concentrated to 40 percent total solids instead of the conventional 26 percent now being generally used. This new product has a tendency to gel and shrink away from the inside of the container, but when the lid is completely removed and the bottom of the can perforated, the entire cylindrical mass slips easily out of the container.

Research was instituted on these two new products for a dual purpose. First objective was to produce a heavier tomato paste, largely used for remanufacturing purposes in the east, and thus reduce freight costs. The second was to produce a concentrated unfrozen tomato juice to be marketed similarly to the frozen citrus concentrates.

Freight savings on this more highly concentrated tomato paste will average one-third of shipping costs. Container costs will also be cut by one-third.

World Food Outlook Altered by Korea

Fundamental changes in the world outlook for food have resulted from the crisis in Korea, the Food & Agriculture Organization of the United Nations reported, late in October, in a study prepared for its 63 member governments.

FAO's crystal-gazing shows that actual and prospective changes are mainly in the direction of greater purchasing power and a larger volume of international trade. The supply outlook for food has not changed significantly nor can it change quickly, FAO reported.

Highlights of the report are:

1. Widespread expansion of military programs will lift purchasing power. Thus, demand for food will be stronger than had been anticipated.

2. Higher import demands and military aid expenditures of the U. S. will make more dollars available through-

out the world for purchases of foods from the U. S., Canada, and other countries.

3. The volume of international trade will rise and its general pattern should tend to improve.

4. There will be no threat of unmarketable surpluses during the next year or two.

5. World food supplies per person in 1950-51 will be larger than in the year before, but supplies of food and the ability to buy it are still far below the levels required to give all the world's people nutritionally adequate diets.

Commodity Report

One of the three main sections of the 81-page report deals with details on selected commodities. An outlook for 1950-51 is presented. Highlights of the food products are:

Grains: The outlook for 1950-51 is for grain crops possibly somewhat larger than last year's in the Northern Hemisphere. Exportable surpluses will be as large as those of 1949-50.

Rice: World production increased in 1949-50 and nearly equalled prewar levels. Increased supply seems likely in the Far East. Rice supplies will continue short compared to other grains, and relatively high prices will probably continue, especially in soft-currency countries. Imports and consumption of wheat will continue high in countries which earlier had depended largely on rice.

Livestock products: Present indications point to a further substantial increase in 1950-51 output of meat and dairy products in Europe, and of continued high levels of output in most other major producing areas. Demand and international trade in livestock products may increase further as a result of the increasing tempo of world economic activity.

Fats and oils: World production and consumption seem likely to increase further in 1950, with the increase largely occurring in the regions where supplies are shortest relative to prewar. Demand seems likely to increase in both hard- and soft-currency areas, and some of the latter will probably be able to finance larger purchases of fats from dollar regions than hitherto seemed likely.

Sugar: Indications for 1950-51 are for a substantially larger crop. U. S. armament program dollars are expected to facilitate maintenance of purchases of sugar from dollar areas.

Citrus fruit: Since devaluation, the ability of the U. S. to compete in the European market has been reduced despite export subsidies. With the liberalization of trade between soft-currency countries, international trade

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Thanksgiving Mode

About 40,000 spectators lined the streets of Worthington, Minn., for the annual King Turkey parade, designed to get the citizenery in a proper mood for the holiday season. About 1,000 bewildered birds provided the marching. (Wide World)

may rise further, while the rapidly expanding market for frozen juice concentrates in the U. S. seems likely to offset without difficulty the effects of any further decline in U. S. exports.

Dried Fruit: Production prospects still uncertain, but the trend is upward.

Coffee: Consumption in 1949 exceeded production and back stocks were used up. Only normal working stock are now at hand. Prices soared to very high levels. Production may be slightly lower in 1950-51 and consumption will likely be 5 to 10 percent below last year. Production prospects are somewhat better for 1951-52. Coffee prices and incomes of exporting countries will continue high.

Tea: Production was up in 1949. Indications are for further increases in output in 1950-51. Consumption likely to rise in view of the short coffee supplies and rising consumers' incomes.

Cocoa: Supplies still short. Demand is increasing steadily and carryover stocks are much reduced. No material change is expected in 1950-51. Plant disease in West Africa is seriously affecting production. Also, producers and governments have been hesitant to expand production, fearing a repetition of the distressed conditions following the 1929 collapse.

Technical Registration Accepted by IFT

Responsibility for registering scientists and engineers in the field of food technology has been accepted by the Institute of Food Technologists, according to Col. Charles S. Lawrence, executive secretary. This registration is being made at the request of the Federal Security Agency, which is preparing a new National Scientific Register (see p. 89, Nov. FI).

"It will be comparatively easy for us to reach IFT members," Colonel Lawrence said, "but there are several thousand food technologists in the U. S. who are not members of the Institute." He said the Institute was using every means at its disposal to reach these non-members, urging them to simply write their names and addresses on a penny postcard and mailing to the Institute office, 176 W. Adams St., Chicago 3. Questionnaires will then be sent to all available food technologists with a view to listing them in the food section of the new scientific register.

New Milk Concentrate Tested by National

After exhaustive consumer trials, National Dairy Corp., chose Wilmington, Del., for an all-out sales test of their newly developed two-to-one milk concentrate. Stressing only convenience and economy of handling and storing, the corporation also holds high hopes for acceptance of the new product from a quality standpoint. Exhaustive taste tests against homogenized vitamin D Grade A milk have indicated full acceptance of the concentrate.

National Dairy technologists have put in close to seven years in developing a concentrate that, when reconstituted, would be equal or superior to top quality regular milk. The new product requires no special handling, beyond the present refrigeration requirements of milk in its conventional form. Its keeping qualities, according to the company, are superior to regular fresh milk.

Its versatility is also expected to appeal to all consumers. Aside from obtaining one quart of regular fresh milk by reconstituting with two parts water, the concentrate provides an extra rich milk for coffee and cereal when mixed with only one part water. It can also be used full strength as a substitute for heavy cream. In this last form it can also be whipped, according to company technologists, but it will not stand up long.

In the Wilmington test the concentrate is being sold at the same price as regular milk.

Company officials will not discuss the processing formula other than to reveal that the water is removed at relatively low temperatures, thus avoiding the cooked taste of previous milk concentrates.

IFT President Selects Award Committee

Completion of the FOOD INDUSTRIES Award committee was announced during the past month by Paul F. Sharp, president, Institute of Food Technologists.

With entries closing Jan. 1, the committee will set to work to study the merits of the processes submitted. Outcome will be the awarding of the 1951 plaque for the outstanding achievement in food technology. The process must have been developed since Jan. 1, 1946, and must now be in commercial use. Entries may be submitted through any member of the committee or through Editor F. K. Lawler of FOOD INDUSTRIES, who is acting as secretary to the committee.

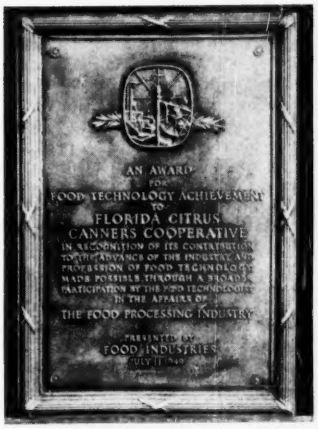
Here are the names and addresses of the complete committee:

Chairman: Dr. Samuel C. Prescott, 77 Massachusetts Ave., Cambridge, Mass.

Voting Members: Dr. E. A. Beavans, Fruit & Veg. Chem. Lab., 263 S. Chester Ave., Pasadena 5, Calif.; Dr. Clifford L. Bedford, Dept. of Hort., Michigan State College, E. Lansing, Mich.; Dr. W. V. Cruess, 336 Hilgard Hall, Univ. of Calif., Berkeley 4, Calif.; Prof. Howard C. Douglas, Dept. of Microbiology, Univ. of Wash., Seattle, Wash.; Prof. Arthur W. Farrall, Agric. Eng. Dept., Mich. State College, E. Lansing, Mich.; Dr. C. R. Fellers, Massachusetts State College, Amherst, Mass.; Dr. Ernest A. Fieger, Dept. of Agric. Chem. & Biochem., Louisiana State Univ., Baton Rouge 3, La.

Dr. William F. Geddes, Univ. of Minn., University Farm, St. Paul, Minn.; Dr. David B. Hand, Div. of Food Science & Tech., NYS Agric. Exper. Sta., Geneva, N. Y.; Dr. Ira A. Gould, Jr., Dept. of Dairy Tech., Ohio State Univ., Columbus 10, Ohio; Dr. B. L. Herrington, Dept. of Dairy Industry, Cornell Univ., Ithaca, N. Y.; Prof. M. E. Highlands, Agric. Exper. Station, Orono, Maine; Dr. Louis B. Howard, Dept. of Food Tech., Univ. of Illinois, Urbana, Ill.; Dr. Walter A. Maclinn, Dept. of Food Tech., Rutgers Univ., New Brunswick, N. J.; Dr. John R. Matchett, 5327 Saratoga Avenue, Chevey Chase 15, Md.; Dr. Emil M. Mrak, Univ. of Calif., Dept. of Food Tech., Berkeley 4, Calif.

Prof. John E. Nicholas, Dept. of Agric. Engr., Penna. State College, State College, Pa.; Prof. Milton E. Parker, Dept. of Food Eng., Illinois Inst. of Tech., 3300 S. Federal St., Chicago 16, Ill.; Dr. Bernard Proctor, Mass. Inst. of Technology, Cambridge, Mass.; Dr. H. A. Schuette, Dept. of Chem., University of Wis., Madison, Wis.; Dr. John A. Shellenberger, Dept. of Milling Ind., Kansas State College of Agric., Manhattan, Kan.; Dr. George F. Stewart, Iowa State College, Ames, Iowa; Dr. Ernest H. Wiegand, 302 N. 29th St., Corvallis, Oregon; Dr. Jasper G. Woodroof, Georgia Exper. Station, Experiment, Ga.; and Dr. W. R. Woolrich, University of Texas, Austin, Tex.



Prepare for FI Award

The last FI Award for a food process went to Florida Citrus Concentrates for its work in developing and placing in commercial use the highly successful method for producing frozen orange concentrate. The 1951 Award Committee has just been announced by IFT President Paul F. Sharp.

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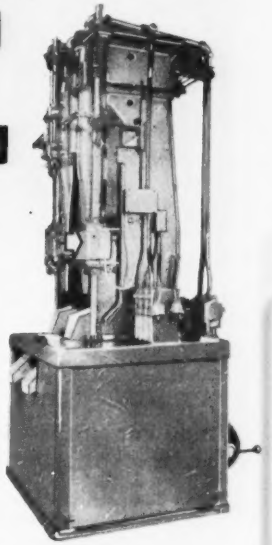

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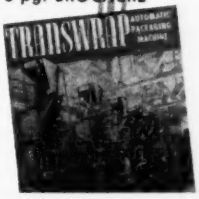

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Pickle Packers Troubled Over Short Supplies

Leon S. Glaser, president, National Pickle Packers Ass'n. told members at the 58th annual meeting of the association, in Chicago, that the next 12 months may be the most crucial in the history of the industry. His concern is based on the industry's statistics.

Supplies of pickles on hand are 25 percent below present demand, whereas a year ago supplies were 30 percent in excess of demand. Pickle sales between Oct. 1, 1949, and Sept. 20, 1950, exceeded $200,000,000, an all-time high, and represents a consumption of 9,790,733 bu. of cucumbers. Consumption between Oct. 1, 1948, and Sept. 30, 1949, was 9,998,610 bu. to establish an average of approximately 9,900,000 bu. of cucumbers to meet present day market needs. Mr. Glaser urged intelligent and forward-looking merchandising, adherence to high quality of product, setting of prices to return a normal profit based on current replacement costs, and continuation of current public relations program.

This year's crop intake as of Oct. 1 was 6,079,923 bu., which is about one-half the 1949 intake. This intake plus the old crop brine stock carry-over gives a total cucumber inventory on Oct. 1 of 8,858,983 bu., as compared with an inventory of 12,569,793 on Oct. 1, 1949; approximately 900,000 bu. less than consumption for the previous 12 months.

Action was taken to continue the 1950 public relations program through 1951 and to underwrite a campaign for increased planted acreage in 1951. The 1950 acreage was 24 percent less than that for 1949. In the absence of new research projects for 1951, increased emphasis is to be put on projects already under way.

Packaging Institute Gets Reports on Materials

Outlook for various packaging materials was discussed at the annual meeting of the Packaging Institute in New York, last month, along with improved packaging technics and important new test methods.

In a report presented by the Institute's president, Charles L. Barr, it was noted that results of a study of packaging costs, by a wide range of industries, indicated opportunities for eliminating considerable waste. Of all the food companies that reported on 39 different packaging operations, the percentage of packaging labor to total direct labor is 60.3 percent. Elimination of waste, which is now an obligation rather than an opportunity for savings, can be achieved through use of improved materials.

Outlook on packaging supplies was discussed by Lee R. Forker, Quaker State Oil Co. In the first half of this year, he said, can makers used five times as much steel tonnage as went into drums. This growing demand reflects increased consumer demand in smaller cans, with food products taking 60 percent of our steel can production. Military demand, he went on, has not yet become an important factor. Inventories of large packers are low or non-existent. Even though tin plate is behind mill shipping schedules, there is optimism—two new tin-plate mills will be built and planned increased capacities are reported for existing mills.

Mr. Forker also noted a steady increase in demand for cotton and burlap bags. Since the middle of this year, demand for wooden containers in general has increased, especially for wire-bound boxes, plywood crates, and nail kegs.

Plastic Films

The plastic film situation is also better today than it has ever been, according to W. F. Cullom, New York City. Military requirements, he said, have not taken more than 5 percent of the plastic film manufactured.

Users of packaging machines were urged by G. W. von Hofe, New Jersey Machine Co., to anticipate their requirements. Many standard machines are now available on reasonably short deliveries. And it would be good insurance for companies, who will find it difficult to get a priority under emergency conditions, to check over their equipment now and replace their older and worn machines with new units before things get too tight. He also urged machine users to amply stock up on repair parts.

Philip I. Heuisler, Maryland Glass Co., told the institute members that it is very doubtful if glass container shipments will become normal before Jan. 1. Glass Container Manufacturers Institute officials predicted that Washington will not put any restrictive orders on design or manufacture of molds for bottles.

There will be an adequate supply of paper and board for packaging when the present scare buying subsides to something like normal, in the opinion of L. T. Stevens, American Paper & Pulp Assn.

Charles A. Lewis, National Production Administration, U. S. Dept. of Commerce, assured the members of the institute that NPA would use its allocation and priority powers only as it became necessary. It would also take a constructive, but not timid, approach to the problems delegated to it.

How electronics has been linked with statistical quality control to provide automatic production-line control of package net weight was described by R. L. Merrill, Batelle Memorial Institute.

R. S. Couch, General Foods Corp., described a new paper-strength test which will indicate, with a fair degree

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of accuracy, the performance to be expected from a bag. In this test, steel balls are machine-dropped on a sample of the paper until it breaks. This takes the place of the filled-package drop test.

A new rapid method—graphical interpolation—of determining moisture equilibria of a product was described by Arthur H. Landrock, Mass. Institute of Technology. This technic, which takes a few hours instead of several days, is based on measuring the rates of gain or loss of moisture content of samples of a product of given initial moisture content when exposed to atmospheres of different relative humidities. Control of the relative humidity of the various test atmospheres is obtained by suitable concentrations of sulfuric acid. An instrumental test method for measuring the rate at which odors pass through packaging films was reported by T. J. Muldoon, General Foods Corp. The actual test cell consists of two 125-mm. crystallizing dishes, with one dish inverted on top of the other. A glass hook, mounted in the center of the top dish, has a small petri dish hanging from it. Rims of both dishes are ground flat to ensure a reasonably tight seal against the sample.

Here's How

When assembled, the petri dish is half-filled with a volatile organic liquid —methyl furoate. A fairly strong solution of KOH is placed in the bottom dish, and the film to be tested is mounted between the two dishes. During storage, the methyl furoate volatilizes to fill the space in the upper half of the cell. Then the vapor diffuses through the film and is picked up in the KOH solution where it is saponified to the potassium salt of furoic acid. The amount of furoic acid in the KOH solution is measured on a spectrophotometer.

A method of collecting and measuring the volume of gas leakage from crowned bottles over a liquid to determine the relative sealing efficiencies of closures was described in a paper presented by H. E. Brockett, Continental Can Co. The apparatus consists of gas-collection tubes sealed over the top of crowned bottles. These bottles with collection tubes are stored under desired conditions and periodic readings are made of the gas volumes in the tubes. Gas leakage can be determined at any time interval and for any total length of time so that rates as well as total leakage can be ascertained.

W. S. Walker, The Linde Air Products Co., pointed up the benefits of nitrogen-packaging of foods in flexible films. Remarkable improvements occur in the shelf-life stability of various foods that otherwise deteriorate from oxidative reactions. Nitrogen packing has been used to correct complaints on taste, odor, color, rancidity, and retention of vitamin content. Transparent films can also be used without fear of daylight exposure, since ultra-violet light cannot catalyze oxidative reactions unless oxygen is present. In some cases, the use of nitrogen packaging eliminates the need for refrigeration and/or antioxidants.

Newly elected Institute officers are: President, Charles O. Kendall, director of planning, E. R. Squibb & Sons, N. Y. C.; Vice-President, Robert S. Couch, Central Laboratories, General Foods Corp., Hoboken, N. J.; Vice-President, Henry W. Stevens, Benj. C. Betner Co., Devon, Pa.

Wheat Quality Measured By Sediment Tests

USDA scientists have developed a simple sedimentation test to measure the quality and quantity of gluten in wheat and thus provide an index to the bread-making quality of wheat.

The test is based on the fact that gluten in a water suspension swells enormously and takes up water rapidly when the proper concentration of lactic acid is added.

A sample of the wheat flour is sifted and put into a water suspension in a graduated glass cylinder. Lactic acid is added. The level to which the swollen gluten settles after a given interval is measured. Both the quantity of gluten and its quality, as shown by its ability to absorb water, are indicated quickly.

Because of the simple equipment required, the new test can be used readily at places and under conditions where experimental milling and baking tests and the farinograph test are impracticable.

The new test has limitations. It should not be used, says USDA, to compare flours of different grades or those produced by different milling processes. But the test is practical, as shown by a check against milling and baking tests made on flour from 1947, 1948 and 1949 wheat crops.

Canned Meat Production Increases 20 Percent

Production of canned meats under federal inspection during the first nine months of 1950 was about 20 percent greater than in the same period last year, the American Meat Institute announced recently.

Canned luncheon meat topped the list in total number of pounds—almost 260,000,000—and showed an increase of 15 percent over last year. Other items, however, accounting for a smaller part of total production, have shown larger increases. Canned ham, second most popular item, attained a production increase of 27 percent. Meat stew, comparatively new member of the canned meat family, also increased 27 percent.

Total production for all items (not including soups) was more than 870,000,000 lb., as compared with about 732,000,000 lb. last year.

Bakers' Annual Meeting Stresses Research

Education and research proved to be attendance-drawing themes at the 1950 annual meeting of the American Bakers Assn., in Chicago.

Acting president John T. McCarthy noted that the average retail price of bread in the United States increased only 5.8 percent between Jan. 1, 1948, and Sept. 15, 1950, in contrast with much higher percentage increases in prices of other commodities, and an increase of 12 percent in the Bureau of Labor Statistics index of average hourly wages.

George H. Coppers, president, National Biscuit Co., New York City, interpreted research as the antidote to obsolescence. He indicated a need for more knowledge about flour and its baking qualities, about mixing methods, about fermentation, about control of staleness and rancidity, about raw materials handling, and about marketing.

Dr. Conrad A. Elvehjem, University of Wisconsin, emphasized his conviction that the future of the baking industry, and of any similar group of food processors, is dependent upon the application of fundamental principles of nutrition and the new findings re-

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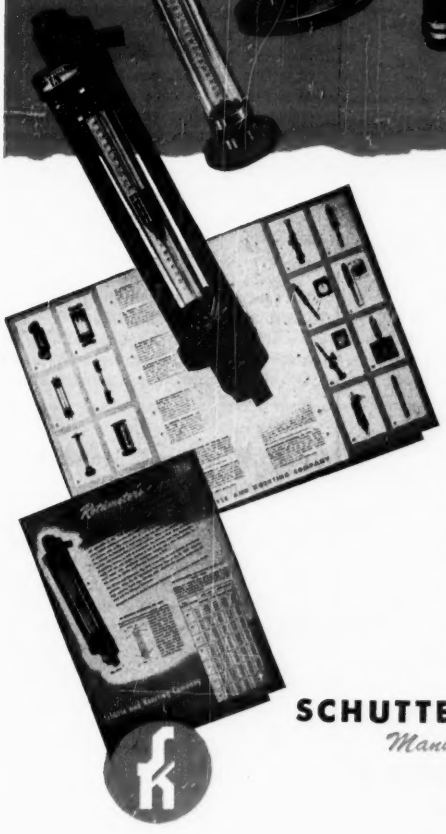

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Now, if you too were a wine grower, you would have been in on the selection of Miss Jane Nigh as the Vintage Queen, to reign during national wine week. What she does when not reigning is perform in front of cameras in Hollywood. (Wide World)

lated to nutrition with the provision, however, that all new developments need not be related to nutrition. The objective, he said, was the production of a highly nutritive product that the consuming public can readily obtain and will consume for the maintenance of good health.

Russell M. Wilder, Division of Medicine, Mayo Clinic, Rochester, Minn., commemorated ten years of bread enrichment by reviewing the happenings that led up to the adoption of the enrichment program and that highlighted the contribution of this program to an improved national health level.

Dedication of the new $1,250,000 home of the American Institute of Baking preceded the opening session of the meeting.

Both Bread and Standards Become "Explosive"

Charges and countercharges were hurled by interested parties in filing exceptions to the tentative order of Food & Drug Administration in the matter of "a reasonable definition and standard of identity for . . . bread, and rolls or buns, etc." An unprecedented salvo was also fired by Food & Drug Administration itself the day before the deadline for tentative order exceptions.

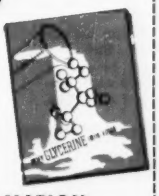
First item of significance was a motion by Atlas Powder Co. and R. T. Vanderbilt Co. on Oct. 25, to reopen the record and extend time for filing exceptions. Two days later, National Independent Meatpackers Assn. peti-

One item you can't forget—Glycerine!

Versatile Glycerine crops up again and again as an ingredient in a variety of food staples, candies, ice cream and beverages! Because it is *absolutely safe to use*, and actually wholesome and nutritious —it has become a standard sweetener, humectant, solvent, preservative and blending agent in innumerable food products. Are you sure you're familiar with the prominent role Glycerine plays in food processing? The numerous applications listed in "*Why Glycerine for Foods?*" may surprise you! Why not write for a free copy?

Equally important, Glycerine serves the nation as an invaluable adjunct in the manufacture of food wrappings, sausage casings and other nontoxic packaging materials. Its possibilities in improving the appearance and palatability of dried fruits is indicated by a patent which has recently come into public domain. The process consists essentially of spraying or immersing the fruit in Glycerine or an aqueous solution thereof which is said to retard drying out and crystallization in storage. Full details will be sent on request.

Nothing takes the place of Glycerine



GLYCERINE PRODUCERS' ASSOCIATION
295 Madison Avenue, New York 17, N. Y.

PLEASE SEND A COPY OF
"WHY *Glycerine for Foods?*" ☐

Please send further information on dried fruit process ☐

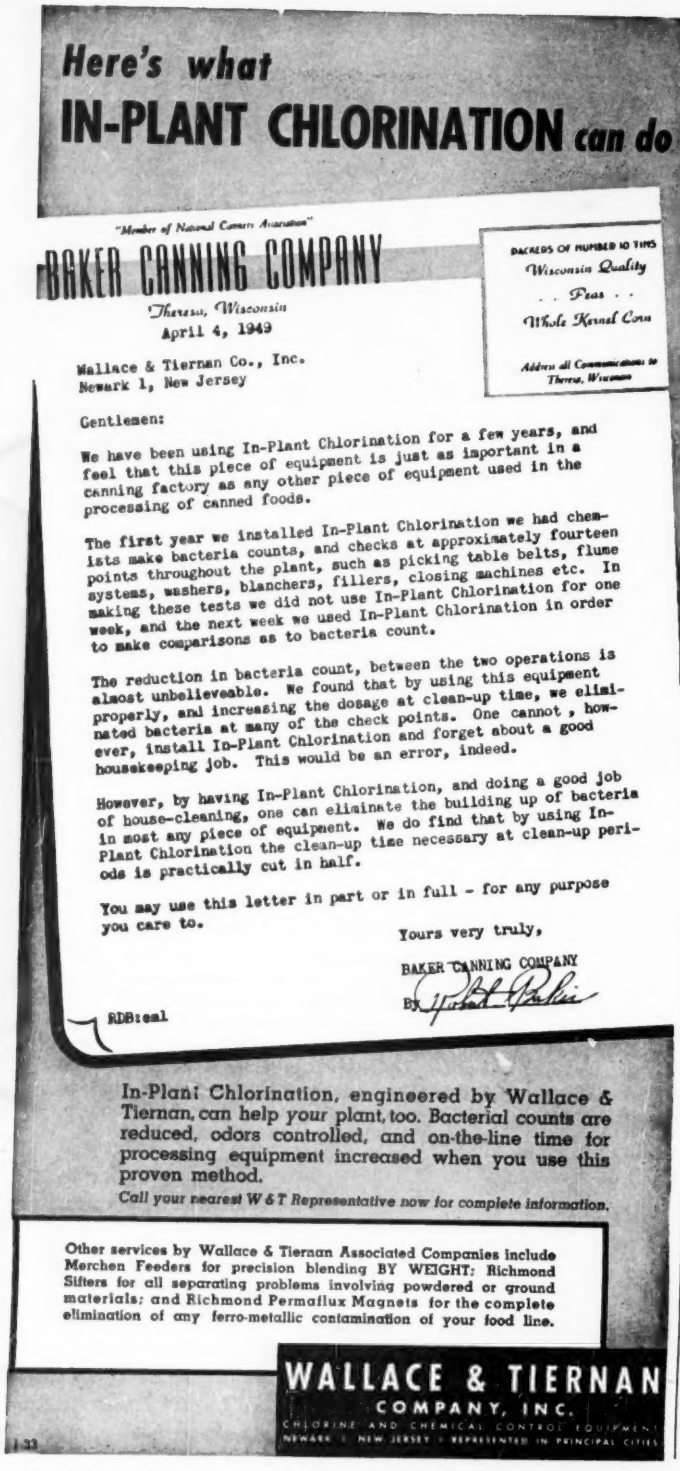
Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____


Here's what
IN-PLANT CHLORINATION can do
"Member of National Canners Association"
BAKER CANNING COMPANY
Theresa, Wisconsin
April 4, 1949
PACKERS OF NUMBER 10 TINS
Wisconsin Quality
Peas
Whole Kernel Corn
Address all Communications to Theresa, Wisconsin
Wallace & Tiernan Co., Inc.
Newark 1, New Jersey
Gentlemen:
We have been using In-Plant Chlorination for a few years, and feel that this piece of equipment is just as important in a canning factory as any other piece of equipment used in the processing of canned foods.
The first year we installed In-Plant Chlorination we had chemists make bacteria counts, and checks at approximately fourteen points throughout the plant, such as picking table belts, flume systems, washers, blanchers, fillers, closing machines etc. In making these tests we did not use In-Plant Chlorination for one week, and the next week we used In-Plant Chlorination in order to make comparisons as to bacteria count.
The reduction in bacteria count, between the two operations is almost unbelieveable. We found that by using this equipment properly, and increasing the dosage at clean-up time, we eliminated bacteria at many of the check points. One cannot, however, install In-Plant Chlorination and forget about a good housekeeping job. This would be an error, indeed.
However, by having In-Plant Chlorination, and doing a good job of house-cleaning, one can eliminate the building up of bacteria in most any piece of equipment. We do find that by using In-Plant Chlorination the clean-up time necessary at clean-up periods is practically cut in half.
You may use this letter in part or in full - for any purpose you care to.
Yours very truly,
BAKER CANNING COMPANY
By
RDB:eal
In-Plant Chlorination, engineered by Wallace & Tiernan, can help your plant, too. Bacterial counts are reduced, odors controlled, and on-the-line time for processing equipment increased when you use this proven method.
Call your nearest W & T Representative now for complete information.
Other services by Wallace & Tiernan Associated Companies include Merchen Feeders for precision blending BY WEIGHT; Richmond Sifters for all separating problems involving powdered or ground materials; and Richmond Permaflux Magnets for the complete elimination of any ferro-metallic contamination of your food line.
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CHLORINE AND CHEMICAL CONTROL EQUIPMENT
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1-33

tioned for further hearing, although NIMPA was said by critics not to have been "an interested person" as far as appearances noted during the course of the hearing.

Principal complaint of Atlas was that mono- and di-glycerides can bring about bread softening, and their safety in the diet had not been demonstrated in the record. Atlas felt that "unintentionally" the Administrator had discriminated between two materials which had competitive relationship. Either both materials or neither should be permitted in bread, according to the Atlas motion.

Institute of Shortening & Edible Oils filed answers to these two petitions on Nov. 2, suggesting to the Federal Security Administrator that the requests be "summarily" denied for a variety of reasons. Other motions, petitions, and answers were also filed, in addition to a score or more of exceptions by the Nov. 8 deadline.

Food & Drug Administration issued a 16-page mimeographed statement with the title "Bread Standards" on Nov. 7. This was stated to be "a brief discussion of the proposed standards.

Michigan Repeals Ban On Yellow Oleo

In a referendum action, Michigan voters in November repealed by a two-to-one margin that state's law forbidding the sale of yellow oleomargarine.

This leaves only 14 states that still prohibit its sale. They are: Vermont, Delaware, Pennsylvania, Wisconsin, Illinois, South Dakota, Iowa, Washington, Wyoming, New York, Connecticut, Minnesota, Montana, and Oregon.

Correction

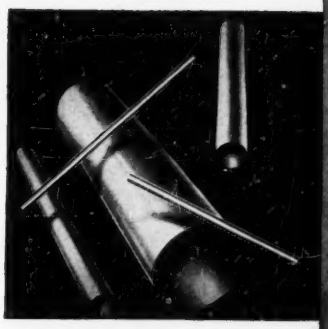
In an article on Cinderella Foods (FI, October, p. 56), reference was made to a bucket elevator for lifting peanuts to the top of a battery of silos. This bulk conveyor is a Redler unit, not a bucket elevator.—The Editors.

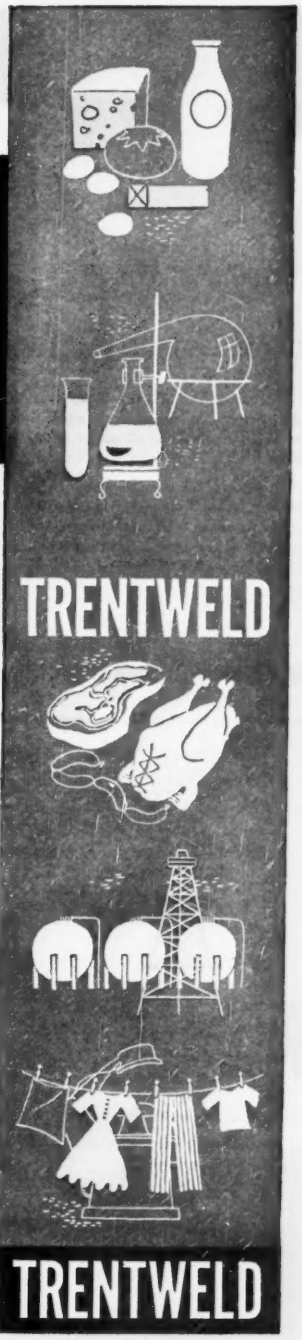
F&DA Food Standards

Status of food standards program of Food & Drug Administration in early November is reviewed below:

Future Hearings

1. *Ice cream*, new, standard of identity. Resumed prewar hearing, first scheduled for Nov. 13, has been postponed to Jan. 8, 1951, at request of International Assn. of Ice Cream Manufacturers. Postponement announced on p. 7338 of Nov. 1 *Federal Register*.





industry wide...it's TRENTWELD

In processing plants throughout industry where cleanliness, corrosion, heat or abrasion are production problems, more and more engineers and designers are looking to TRENTWELD Stainless Steel Tubing for the answer.

That's because TRENTWELD is made in a *tube* mill by *tube* experts . . . who roll and weld stainless and high alloy tubing *without* added rod metal. Developed by Trent specialists, this method results in tubing that is metallurgically correct and has a uniform section . . . with no zone of weakness for corrosion to attack.

The complete TRENTWELD line . . . 1/8″ to 22″ diameter in long lengths and up to 30″ diameter in shorter lengths . . . offers a wide range in a variety of grades, gauges and finishes for almost every industrial application.

Whatever your industry, there's TRENTWELD Tubing to fit your design. Our years of experience as tube specialists is at your call. Write us full details about your application.

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Subsidiary Crucible Steel Company of America
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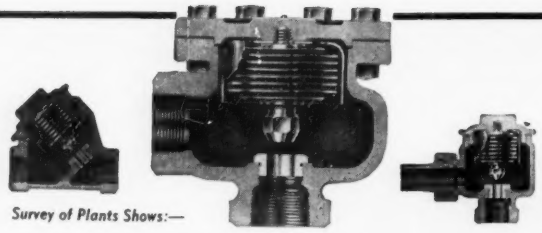
STAINLESS STEEL TUBING

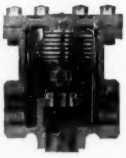


Survey of Plants Shows:—

15 of 20 Engineers Prefer Nicholson Traps

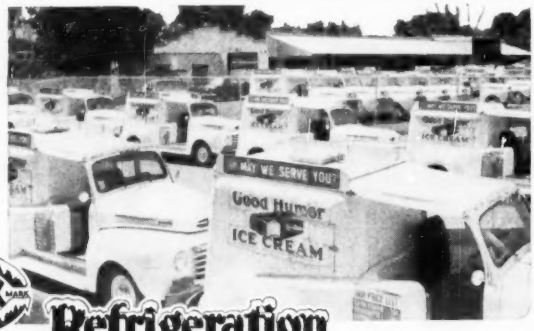
To determine the best steam trap on which to standardize, a large processing firm recently asked their plant engineers for their preference. In 15 out of 20 plants the choice was Nicholson.

The repeated adoption of Nicholson steam traps in plants currently in big "cost-reduction-through-modernization" programs is another indication of their advanced features. To learn why an increasing number of leading plants are standardizing on Nicholson thermostatic steam traps send for our catalog. 5 types for every power, heat, process use; size ¼" to 2"; press. to 225 lbs.



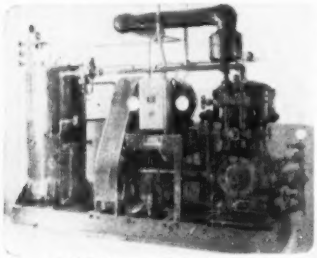
Catalog 250 or see Sweet's

W. H. NICHOLSON & CO. 193 OREGON STREET WILKES - BARRE, PA.



TRADE FRICK MARK Refrigeration

Holds temperatures 18 degrees below zero in the new storage from which the Helned Corporation distributes Good Humor Ice Cream in Philadelphia. Fifty trucks are served by this storage. Installation by the Mack Machine Co. of Pennsylvania, Philadelphia Distributors for Frick Air Conditioning and Refrigeration.



Frick Refrigerating Unit in Service at Helned Corp., Philadelphia

The leaders buy Frick equipment because it is DEPENDABLE. Let us quote on your cooling needs.

DEPENDABLE REFRIGERATION SINCE 1882
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Also Builders of Power Farming and Sawmill Machinery

Essential Oil Exchange

Giuseppe Sacerdote, representing the Italian government, has been in the U. S. investigating the markets for Italian natural essential oils. He believes there is a rich field for mutual advantage in the exchange of Italy's natural essential oils for America's synthetic variety, since there is great demand for these American oils in Italy.

---

2. *Preserves*, amendment. Hearing, requested by industry to follow ice cream hearing; announcement expected soon.

3. *Margarine*, amendment. Hearing rumored to be requested by industry; would raise vitamin A minimum content and would specify method of vitamin analysis.

4. *Evaporated milk*, amendment. Hearing announcement rumored; would raise vitamin D content and would specify method of vitamin analysis.

Hearings in Progress

None.

Tentative Orders Awaited

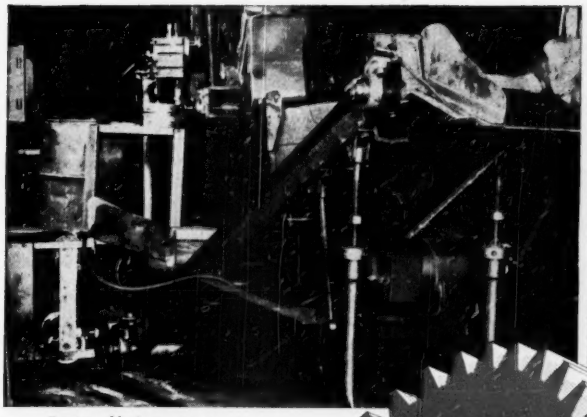
1. *Canned mushrooms*, amendment, standards of identity and fill. Expected soon; hearing adjourned in June 1950, briefs filed in July.

2. *Residue tolerances*, on fresh fruits and vegetables; new. Not expected soon; time for filing briefs extended to Dec. 15, by presiding officer's letter of Oct. 25 to all persons who made appearances at the hearing.

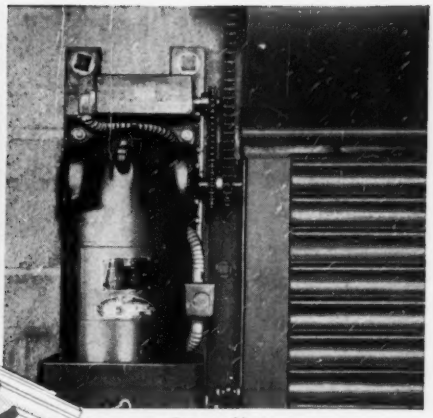
Final Orders Awaited

1. *Canned corn*, amendment, standards of identity, quality, and fill. Expected soon; tentative order published in April 1950, exceptions filed in May.

2. *Cream cheese with (and) other foods; Neufchatel cheese spread with (and) other foods*, new, standards of identity. Exceptions filed by Oct. 23;



Century ¼ horsepower gear motor driving a conveyor



Century ½ horsepower gear motor operating a door opener

Specify COMPACT, RUGGED

Century GEAR MOTORS

for Your High Torque Slow Speed Requirements

Century's line of gear motors has gained an enviable reputation, created by their successful performance on thousands of industrial machines. They are built to supply the right power at the right speed.

Century Gear Motors are engineered to maintain the high torque slow speed shaft in rigid alignment. The gear housing and mounting feet are cast in one piece to provide extra strength and rigidity. In addition, the slow speed shaft is located near the base for greater strength and rigidity.

The motor is equipped with ball bearings and the shaft with tapered roller bearing.

Century Gear Motors are available in sizes from ⅛ to 1½ horsepower — single phase, polyphase and direct current.

Specify Century Gear Motors for all your slow speed power requirements.

CENTURY ELECTRIC COMPANY

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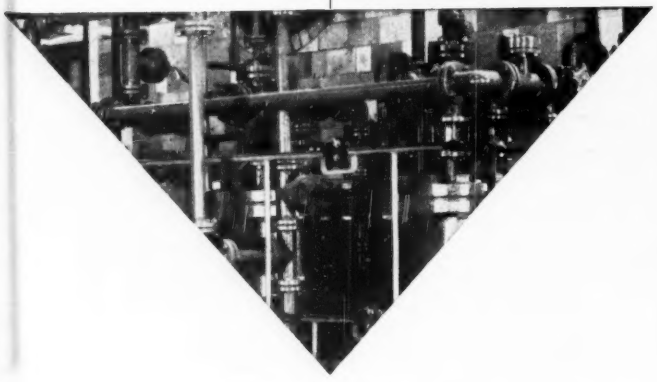
steel pipe

cuts repairs and replacements to a minimum!



The conveyance of corrosive liquids can prove as hard on profits as it is on equipment. It's this realization that has compelled more plants than ever before to install corrosion-resistant saran lined steel pipe. Saran's resistance to most chemicals and solvents reduces shutdowns and lost production! Saves time and labor!

Saran lined steel pipe is available in maximum lengths of 10 feet and in sizes from 1 to 6 inches inclusive. Also available are saran lined diaphragm valves, plug valves, flanges, reducing flanges, flanged fittings, gaskets and fittings with union ends.

Write us today for further information concerning saran lined steel pipe and how it may help solve your corrosion problems. Manufactured by The Dow Chemical Company, Bay City, Michigan, distributed by Saran Lined Pipe Company, Dept. TSP-69

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SARAN LINED PIPE a DOW product

some question as to whether the final order can be issued without taking additional evidence; reopened hearing has been rumored but not announced.

3. *Bread*, new, standard of identity. Not expected soon; two requests for reopened hearing received prior to Nov. 8 deadline for filing exceptions.

4. *Frozen Fruits*, new, standard of identity and fill. Not expected soon; although exceptions could be filed until Nov. 18, an extension in this time had been requested before the first week of November.

Standards Completed

None since last reports (latest covered on p. 147 Oct. FI).

USDA Grade Standards

Recent actions by Production & Marketing Administration of the Dept. of Agriculture on U. S. Grade Standards and related activities include the following:

Milk for use in manufacture of dairy products, new, proposed, p. 6475, Aug. 17 *Federal Register*, time for written comments was extended to Nov. 30.

Edible sugarcane molasses, new, proposed, p. 6474, Sept. 26 *Federal Register*, (corrections p. 6598, Sept. 30 *Federal Register*), time for written comments extended to Jan. 20, 1951.

Sugarcane syrup, new, proposed, p. 6476 Sept. 26 *Federal Register*, time for written comments extended to Jan. 20, 1951

Schedule of Events

January

8–10—Michigan State College, annual processors' fieldmen's conference; School of Agriculture, East Lansing, Mich.

15–18—American Society of Mechanical Engineers and Society for the Advancement of Management, plant maintenance conference and show; Auditorium, Cleveland.

February

11–13—Institute of American Poultry Industries, fact-finding conference; Kansas City, Mo.

17–25—National Canners Assn., in conjunction with National Food Brokers Assn. and Canning Machinery & Supplies Assn.; Stevens Hall, Chicago.

21–23—Purdue University, 6th industrial waste conference; Lafayette, Ind.

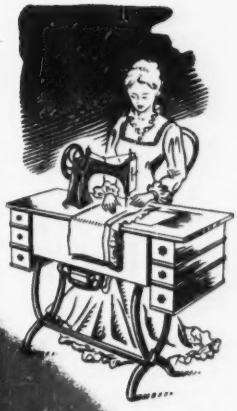
27–Mar. 2—National Assn. of Frozen Food Packers, et al, frozen food convention; St. Francis Hotel, San Francisco.

March

5– 8—American Society of Bakery Engineers, 27th annual meeting; Edgewater Beach Hotel, Chicago.

27–29—University of Wisconsin, dairy manufacturers' conference; College of Agriculture, Madison, Wis. —*End*

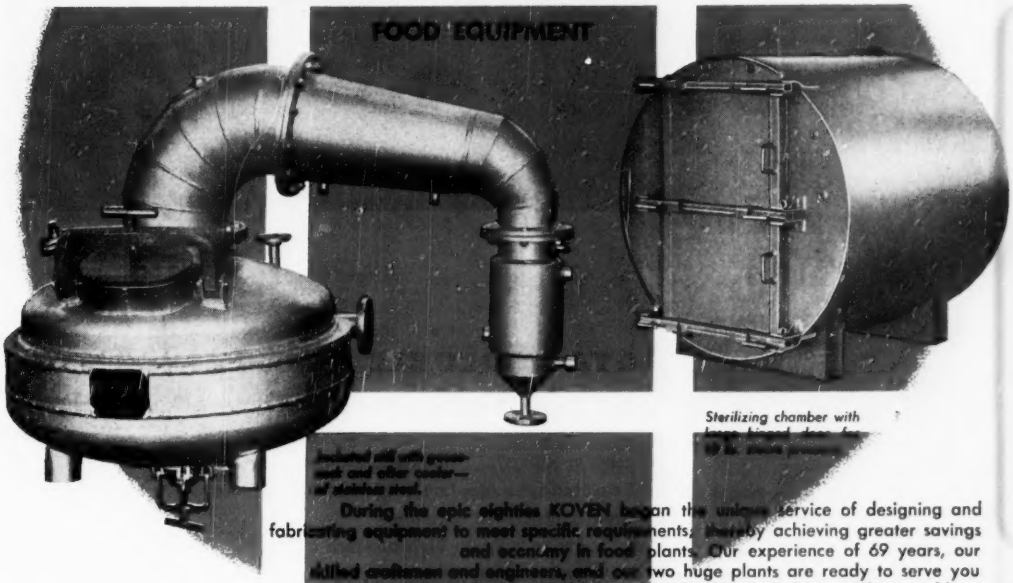
BACK IN THE 1880's



WHEN SINGER INVENTED THE FIRST ELECTRIC SEWING MACHINE

Koven

WAS MAKING INDIVIDUALIZED FOOD EQUIPMENT



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During the epic eighties KOVEN began the unique service of designing and fabricating equipment to meet specific requirements, thereby achieving greater savings and economy in food plants. Our experience of 69 years, our skilled craftsmen and engineers, and our two huge plants are ready to serve you with complete, modern facilities including: machine, welding, painting and galvanizing shops, X-ray equipment and stress-relieving furnace.

Among the many KOVEN products in all commercial and non-corrosive metals: Stainless Steel; Aluminum Sheet Fabrication; Boxes, Tote, Waste Cans; Chemical Apparatus; Coils and Pipe Bands; Copper Sheet Fabrication; Galvanizing Work; Mixers, All Kinds; Monel Metal Fabricators; Pails, Special Heavy; Pans, All Types, All Metals; Sinks, Scullery and Factory; Tables, Galvanized or Monel; Tanks, All Types, All Metals; Kettles, All Types, All Metals.

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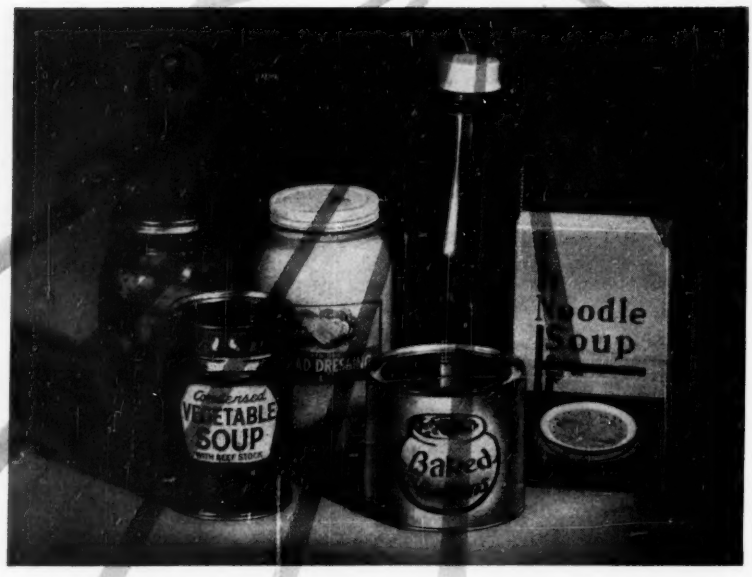
Dover, N. J

KOVEN FOR INDIVIDUALIZED FOOD EQUIPMENT SINCE 1881

Cloudy and Earthy Flavors are Removed to Produce



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ROYAL SOLUBLE SEASONINGS are truly distinctive—in flavor potency, purity and uniformity! Griffith has conquered the disturbing elements in nature! . . . eliminated the flavor variations in spices! And changed spice blending from an art to a science—with predictable, dependable results for spice users.

The secret to this new, high standard in flavor quality lies in Griffith's revolutionary extraction process.* It *removes* the disturbing strains in flavor . . . *captures and measures* the full potency of "true" flavors in spices.

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PEPPEROYAL and all ROYAL SOLUBLE SEASONINGS derived from Griffith's new extraction process.* Formulae tested for that "taste of sunshine" in Griffith's model production kitchen.

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Changes in Food Supplies

Production

ICE CREAM production in September, estimated at 46,600,000 gal., was slightly above September, 1949, but 16 percent under the 1944-'48 average for the month. August-September decline was 25 percent, compared with 31 percent a year ago and a 5-year average decline of 15 percent.

AMERICAN CHEESE output during September was estimated at 67,830,000 lb., 9 percent under September, 1949, and 3 percent below the 5-year average for the month. Seasonal decline was 19 percent, compared with 15 percent a year ago, and a 5-year average drop of 17 percent.

CREAMERY BUTTER production during September, estimated at 103,540,000 lb., was 9 percent under September, 1949, but fractionally above the 5-year September average. August-September decline was 17 percent, compared with 11 percent a year ago and a 5-year average decline of 16 percent.

MARGARINE production in September dropped to 65,816,000 lb., compared with 74,408,000 lb. turned out in September, 1949. The September decline was particularly severe in view of the 84,129,000 lb August output.

CANNED ALASKA SALMON packed in 1950 comprised the smallest total since 1921. Output came to 3,235,828 cases, on a 48/1's basis. Production in 1949 was 4,375,147 cases, according to NCA.

RED PITTED CHERRIES packed in 1950 totaled 5,022,951 actual cases, which compares with 3,445,323 cases packed in 1949.

DRIED EGG production in September came to 3,739,000 lb., compared with 1,743,000 lb. turned out during September, 1949, and a 5-year September average of 7,293,000 lb.

POULTRY canned or used in canning during September reached 9,956,000 lb., compared with 8,333,000 lb. in September, 1949, and a 5-year average of 7,042,000 lb.

NONFAT DRY MILK SOLIDS produced in September came to 43,500,000 lb., down 31 percent from a year earlier, but up 8 percent from the 5-year average for the month.

DRY WHOLE MILK output in September, at 10,400,000 lb., was the lowest for that month since 1943. Output was down 3 percent from September, 1949, and 22 percent from the 5-year average for the month.

GREEN PEAS packed in 1950 amounted to 29,081,000 cases on a 24/2's basis, according to the National Canners Assn. The 1949 pack, on the same basis totaled 23,468,000 cases.

FROZEN GREEN PEAS climbed to a new production peak in 1950, according to a preliminary report of the National Assn. of Frozen Food Packers. Pack totaled 154,448,216 lb., approximately 36 percent above 1949. The previous record was set in 1946 when 140,602,919 lb. were packed.

FROZEN EGG production continued on a high level during September, reaching a total of 8,444,000 lb. This compares with 5,448,000 lb. turned out in September, 1949, and a 5-year September average of 8,283,000 lb.

FROZEN STRAWBERRY production climbed high in 1950, the NAFFA tabulation reaching 141,937,374 lb., compared with 98,317,626 lb. in 1949. Both figures exclude California production, which extends into November.

Storage

FROZEN FISH and SHELLFISH held in storage October 1 totaled 157,533,954 lb., compared with 150,607,730 lb. held on the same 1949 date.

COOLER occupancy dropped 1 point during September to stand at 63 percent on September 30. This was 5 points below average, but 3 points above the level a year ago.

FREEZER occupancy held at 74 percent on September 30, no change from the previous month. Occupancy, however, was 4 points under average.

Indexes

Business Week's index of business activity dropped to 219.7 for the week ending Nov. 11, down over a point from the previous week's 220.9. A month before it had been 223.0, and a year before, 166.5.

THE COMMODITY INDEX on foods, compiled by the *New York Journal of Commerce*, stood at 183.6 for the week ending Nov. 17, compared with 182.3 for the previous week. Average for October was 182.9, and for November 1949, it was 177.0.

WALLMASTER

Scientific method for restoring and preserving cleanliness of painted walls and ceilings.

Constant high level of maintenance so essential in food plants now offered at operating cost of under 50¢ daily!

HANDEASY*, exclusive attachment for WALLMASTER, cleans painted *rough* brick, moldings . . . any uneven surface mechanically, with controlled moisture feature.

No drip . . . No odor . . . No electricity

Write today for a free demonstration!

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Send us a sample OF ANY STOCK YOU WANT TO PULVERIZE

We'll make a test grind with

SCHUTZ-O'NEILL PULVERIZER

You will receive our Engineering Report suggesting the best method to use and the type of Schutz-O'Neill Pulverizer and any receiving or sifting equipment suited to your requirements.

SCHUTZ-O'NEILL offers you the benefit of more than a half century of experience in rapid, accurate, dustless pulverizing of any dry, grindable, non-gritty stock.

SCHUTZ-O'NEILL Pulverizers are made in 6 sizes with capacities up to 2000 lbs. per hr. Also Gyrator Sifters, Roller Mills, Receiver Boxes, Collectors, Hammermills, etc.

When sending sample, be sure to state fineness desired.

ESTABLISHED 1893 SCHUTZ-O'NEILL CO.

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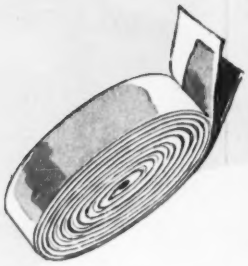


versatile VISQUEEN* *film*

it's the newest way to solve old problems

VISQUEEN film in the Rubber Industry
Excellent results as protective material for camelback and tacky tape put it at the top in the field in less than a year.

VISQUEEN film in the Shipping Industry
Absolute product protection against moisture and contamination in domestic and overseas shipments. Film liners for metal drums, fiber drums and cartons. Definitely cuts shipping costs. Saves time and handling.

VISQUEEN film in the Chemical Industry
Liners for packaging all types of chemicals, wet, dry, corrosives or hygroscopics. Positive product safety.

VISQUEEN film in the Automotive Industry
Used for packaging parts both while in storage in the plant, in transit to parts depots and on shelves in service stations.

VISQUEEN film in the Packaging Industry
Reusable bags for premium packaging of all types. Women love them. Protective packaging where contents must be kept from moisture or contamination from the outside; where constant moisture must be maintained inside.

There just aren't enough pages in this issue of Food Industries to give a satisfactory description of the unlimited uses industry has found for VISQUEEN polyethylene film. For packaging, shipping, storing—it's a completely new and radically different method with startling possibilities.

VISQUEEN film is strong, pure and odorless. It will handle liquids, semi-liquids, hygroscopics, acids and alkalis with perfect safety. The film is moisture-proof, non-toxic and chemically inert. Extremes of temperature or humidity changes leave it unaffected—at 94 degrees below zero VISQUEEN is strong and flexible. Available in a variety of thicknesses from very thin to very thick, and in clear seamless tubing or sheeting. Produced in a wide range of widths, VISQUEEN has been made in tubing as wide as 120 inches.

Wherever VISQUEEN film is used—in shipping or packaging, or as a premium—the remarkably low cost, the drastic economies effected and the positive product protection prove it to be absolutely without an equal.

VISQUEEN film . . . a product of The

VISKING CORPORATION

PRESTON DIVISION, TERRE HAUTE, INDIANA

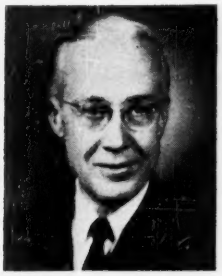
*T. M. The Visking Corporation

IMPORTANT

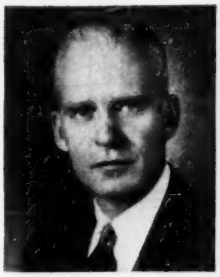
All polyethylene film is not VISQUEEN. VISQUEEN is the only film produced by the process covered by U.S. Patent No. 2461975. Only VISQUEEN film has the benefit of the research and extensive technical experience of The Visking Corporation, pioneers in the development of polyethylene film. Be sure. Always specify VISQUEEN film for superior tear and tensile strength and greater uniformity.

Men, Jobs, Companies

HARRY W. WALMSLEY has been appointed to the newly created position of plant superintendent of A. E. Staley Mfg. Co., Decatur, Ill. He will insure broader supervision of production facilities.



HARRY M. MULBERRY has been named provision department head of Swift & Co., Chicago. With company for 35 years, he represented it on Chicago Board of Trade. He succeeds Henry McCaw.



W. G. ANDREWS has been elected to the position of assistant vice-president of Archer-Daniels-Midland Co., Minneapolis. He joined company as control and research chemist nine years ago.

L. H. McCLAREN, formerly with Quality Bakers of America, has joined the bakery division staff of the American Dry Milk Institute, Chicago. He was first president of Chicago Bakery Production Men's Club.

Industry

Colonial Sugars Co. has completed construction of a 4,000,000-lb. sugar bin at Gramercy, La., for $100,000.

General Mills, Inc., Minneapolis, has organized a new division to handle its flour, feed and packaged food business. Walter Barry is president. Company has also discontinued its packaged soup line and closed its plant at Oskaloosa, Iowa.

Grand Island Fruit Co. of Umatilla, B&W Canning Co. of Groveland, and Postal Colony Co. of Clermont, all Florida citrus companies, have merged $17,000,000 worth of assets.

Great A & P Tea Co. plans a $1,250,000 combined perishables warehouse, office, and trucking center in Toledo, Ohio.

Green Giant Co., Le Sueur, Minn., plans a test market operation on frozen peas in the Ft. Wayne, Ind., area, under the "Green Giant" label.

Hart's Fruit Products has completed a $100,000 addition to its citrus processing facilities in Brea, Calif.

Holsum Bakers, Inc., Tampa, Fla., has construction of an additional 50,000 sq. ft. under way.

International Assn. of Milk & Food Sanitarians has elected the following officers: Dr. K. G. Weckel, President; H. J. Thomasson, President-Elect; H. J. Barnum, 1st V-P; John Faulkner, 2nd V-P; George West, Secretary.

McCormick & Co.'s bulk and institutional division has added a chicken-flavor base and instant chocolate mix to its Banquet Brand line.

National Biscuit Co.'s new Portland Ore., plant—termed largest bakery in west—is on its shakedown run. It will turn out 40,000,000 crackers daily, using continuous mixing.

National Pickle Packers Assn. re-elected the following officers for 1951: Leon S. Glaser, President; James M. Irwin, Vice-President; Earl Van Holten, Treasurer. Directors for 3-yr. terms are: Lewis Hirsch, Nelson Morgan, Harry Tuttle and Earl Price. Addis Cates was elected to fill the unexpired term of H. Roy Cates, deceased.

National Poultry, Butter & Egg Assn. has elected Joseph E. Goldberg as president.

Sawyer Biscuit Co., Chicago, is building a $5,000,000 modern cookie and cracker plant in Melrose Park, Ill.

South Texas Producers' Assn. has started processing 200,000 lb. of milk daily in its new plant at LaGrange, Tex.

Sunshine Biscuits, Inc., New York City, moved into a new $40,000 warehouse in Roanoke, Va., during October.

Swift & Co. has built a plant at Jasper, Ind., for processing broiler chickens at rate of 2,500 an hour.

Tea Assn. of the USA has elected C. Claridge, vice-president of Salada Tea Co., Boston, as president.

Personnel

Charles H. Bell, formerly director and research-production coordinator, General Mills, Inc., Minneapolis, has been elected executive vice-president.

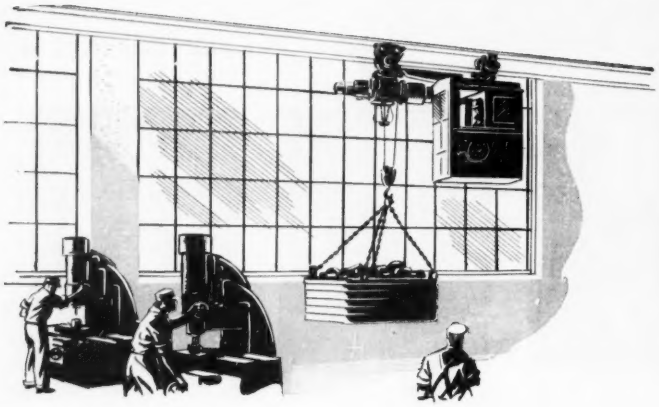
Kenneth Benson has been employed by the Chicago Quartermaster Purchasing Office to contact canners in the Wisconsin area.

A. S. Dale has been appointed head of dairy and poultry department, Wilson & Co., Chicago, succeeding E. J. Davidson, retired.

E. R. Hart has been named assistant manager of the St. Paul district for Armour and Company.

John A. Hart has been designated general traffic manager of the National Biscuit Co. Edwin F. Mundy is assistant and Harland R. Black is new manager of materials handling division.

E. E. Hays has been assigned as assistant general manager and director of research at Armour and Company, Chicago. J. D. Porsche is director of research and development, 31 St.



For lowest-cost-per-load...

use dependable thru-the-air handling

KEEP in mind these important advantages which "through-the-air" handling alone gives you. Unrestricted use of floor space, accurate spotting of work, higher stacking, greater dependability and safety, lower upkeep and longer life. On the production line or when storing or warehousing, they add up to worthwhile savings.

For a great many years, we have devoted our entire facilities to the manufacture of cab-operated and floor-controlled hoists, and overhead traveling cranes—and to laying out plant systems to make them the most efficient of all lifting and conveying tools.

May we show you pertinent data on installations similar to yours?

Shepard Niles

CRANE & HOIST CORPORATION

Makes and sells all three lifting tools for airborne shop loads

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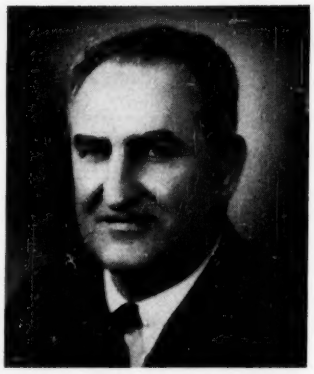

H. H. COREY, president of George A. Hormel & Co., Austin, Minn., has been elected chairman of board of the American Meat Institute.

---

lab, and J. B. Lesh is director of biochemical research.

Arthur Jordan, Jordan Baking Co., Tacoma, Wash., has been elected chairman of the Wholesale Bread branch, American Bakers Assn.

Fred A. Kummerow has been named assistant professor of food technology with Kansas State College, Manhattan.

Edward A. Martin has been appointed general manager of Armour and Company's meat packing plant in Jersey City, succeeding F. X. Leyden, deceased.

Gregg R. Meyers, safety director, Blatz Brewing Co., Milwaukee, has been elected secretary of the executive board, brewing division, National Safety Congress.

Gerald D. Miller of the milling industry department, Kansas State College, has been awarded the Shafer Trophy for accuracy in testing flour samples.

Roy E. Morse has been named research group leader of the food technology laboratory in Monsanto Chemical Co.'s Anniston, Ala., plant.

L. B. Parsons and **N. T. Joyner** have been named assistant directors of research for Lever Bros. Co.

Harry A. Smith has been elected vice-president in charge of production for the John E. Cain Co., Cambridge, Mass. Curtis L. Kehew was elected vice-president of sales.

C. E. Soward has been appointed vice-

IT'S GOT TO BE *Continuous!*

THE FLASHING STRIDE OF THE RECORD-BREAKER

AND YOU CAN INCREASE PRODUCTION WITH CONTINUOUS SEPARATION THE DE LAVAL CENTRIFUGAL WAY!

When De Laval machines, utilizing centrifugal force, replace gravity or other less efficient methods of separation or clarification, they speed up the whole process by making it continuous. Doing work in a few seconds that otherwise would take minutes or hours, De Laval centrifugals remove a "point of interruption" on a flow chart and thus bring about major production increases.

Each type of De Laval centrifugal is a highly specialized machine. Some are clarifiers, removing a solid impurity from a liquid. Some both separate and clarify — that is, they not only divide two liquids according to their respective gravities, but likewise remove and continually discharge the solids as well.

● *Write for complete information.*

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165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

De Laval

the First Name in Centrifugals
the First Thought for CONTINUOUS
SEPARATION · CLARIFICATION · CONCENTRATION

NOW-a truly STAINLESS STEEL

FILTER PRESS

PLATE AND FRAME TYPE

1—Simple to clean—easy to maintain.

2—A truly Sanitary Filter Press—all surfaces polished, no crevices where bacteria may collect.

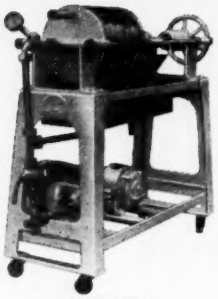
3—"Snap - Lock" perforated screens — no screws to hold screens in place, no soldered elements.

4—No gaskets—no contamination, minimum leakage.

5—Any thickness sludge and cake frames.

6—Type #302-#304—or #316 Stainless Steel.

SANITARY



MODEL 10SS
OPEN—READY TO CLEAN

Proven by use in filtering—hot frying oils, citrus juices, milk and milk products, extracts, vinegar cider, syrups, alcoholic and non-alcoholic beverages.

Star EST. 1906

LIQUID MACHINERY CORP.

871 Edgewater Rd., Hunts Point, Bronx 59, N. Y.

Standard designs and builds conveying equipment for many nationally famous packers of food in cartons, cans, jars, bottles, or bags.

Whatever you make, package, or handle—in large or small quantities—see Standard for a complete engineered conveyor system, a portable conveyor unit, a portable conveyor section.

The range and versatility of Standard equipment has been developed in more than 40 years of service to business and industry.

STANDARD CONVEYOR COMPANY

General Offices: North St. Paul, Minn.
Sales and Service in Principal Cities

Engineered Conveyor Systems — Portable Conveyor Units — Spiral Chutes — Pneumatic Tube Systems

Write, telling us what you make or handle. We will send literature showing Standard Conveyors in use in your business. Address Dept. FI-120

LOUIS E. DOXSIE has been named production superintendent of A. E. Staley Mfg. Co., Decatur, Ill. He started with company in 1933 as an extra board laborer, and now succeeds Harry W. Walmsley.

president of Robin Hood Flour Mills Ltd., Montreal, Can.

D. W. Tracy has been named St. Paul district manager for Armour and Company, succeeding L. W. Griffith, retired.

Associated Industry

Allied Trades of Baking Industry re-elected following officers for 1951: John P. Garrow, Chapman & Smith, Chicago, President; Frank Torrens, Brolite Co., New York City, Vice-President; and Claude Bascombe, Standard Brands, Secretary-Treasurer.

Howell Electric Motors Co., Howell, Mich., has appointed Bates Sales Co. as its new representative in the St. Louis area.

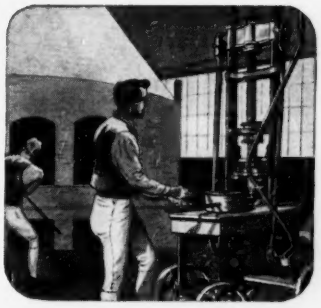
Hyster Co., Peoria, Ill., has named Robert F. Moody assistant sales manager of the eastern division. French Mill Supply Corp. is new central New York State representative, while Speer & Co. has taken over parts of Ohio, Indiana and Kentucky.

Lear, Inc., Grand Rapids, Mich., has appointed A. W. Eichmann, electro-mechanical expert, to its sales staff.

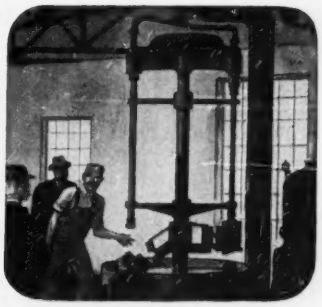
Norda Essential Oil & Chemical Corp., New York City, has named Leonard S. Brooks western division sales manager, with headquarters in Los Angeles.

Ohio Injector Co., Cleveland, has named Paul E. Warner as Philadel-

1 1621—Glass was money! America's first glass factory was actually a mint—not for the manufacture of coins but to make glass beads for *use* as money when buying land, food and furs from the Indians.



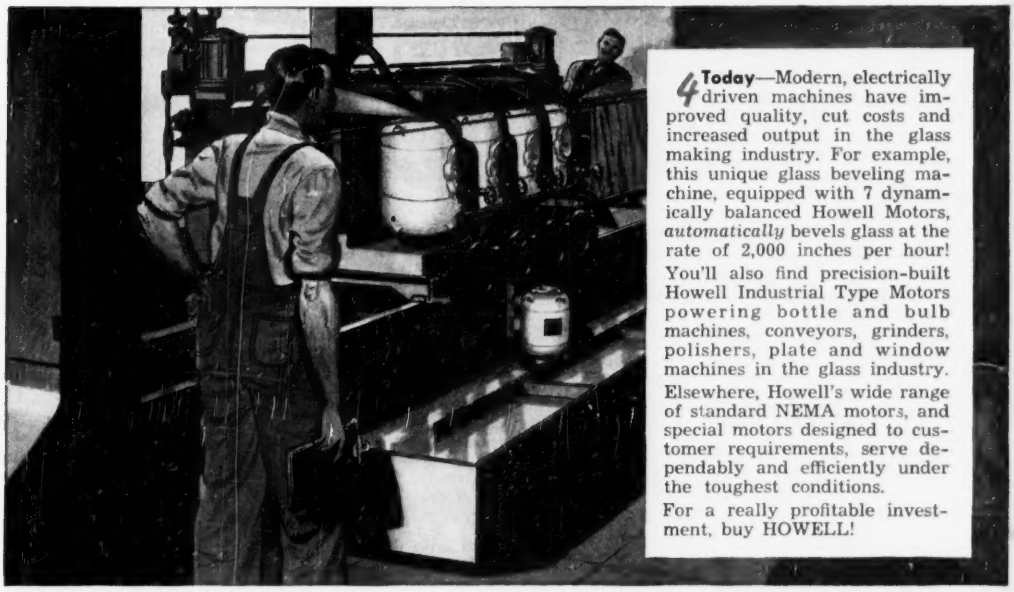
2 1827—Blown glass was the rule until Enoch Robinson, a carpenter, figured glass could be *pressed* into shape . . . the glass pressing machine was born. Electricity to power new machines was still to come.



3 1899—Owens invented a machine to make bottles as the machine age arrived in glass. By 1915, Howell "Red Band" Motors were making important contributions to this and other industries.

ANOTHER HOWELL SUCCESS STORY

GLASS...from artisans to automatic machines



4 Today—Modern, electrically driven machines have improved quality, cut costs and increased output in the glass making industry. For example, this unique glass beveling machine, equipped with 7 dynamically balanced Howell Motors, *automatically* bevels glass at the rate of 2,000 inches per hour!

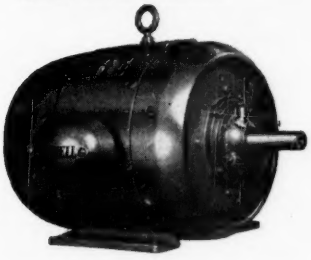
You'll also find precision-built Howell Industrial Type Motors powering bottle and bulb machines, conveyors, grinders, polishers, plate and window machines in the glass industry.

Elsewhere, Howell's wide range of standard NEMA motors, and special motors designed to customer requirements, serve dependably and efficiently under the toughest conditions.

For a really profitable investment, buy HOWELL!

Free enterprise encourages mass production, supplies more jobs—provides more goods for more people at less cost.

Howell totally enclosed, fan-cooled motor—windings completely sealed against dirt and weather.



HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Precision-built Industrial Motors Since 1915

HOWELL Red Band MOTORS

One Of The Most Challenging Pieces Of Trade Literature Ever Published!

The title of the pamphlet—"*Nothing Ventured.*"

Contents—a gratis offer by a food processing equipment manufacturer to reveal, upon request, the contents of case history files containing a *sixty-year* compilation of exclusive performance facts and figures—accumulated through the application of a patented method for separating dry commodities by specific gravity through air-flotation.

This "never-heretofore" offer gives the imaginative process engineer an opportunity to initiate a chain of events designed to prove conclusively whether or not the famous SS&S Process can provide immediate and profitable solutions to specific product cleaning, classifying, and grading problems.

Free copies, from the second printing, are now available to food processing personnel serving in a supervisory capacity.

SUTTON, STEELE, & STEELE, INC.
1031 South Haskell, Dallas, Tex. Dept. A-1250

Please forward _____ *copies of the pamphlet titled* — "NOTHING VENTURED" — *to:*

Name _____ Position _____

Company _____

Street Address _____

City _____ State _____

J. PAUL BRYANT has been named vice-president in charge of the Fleischmann Div., Standards Brands, Inc. He joined the company in 1924 as assistant chief clerk. Another promotion in the Fleischmann Div. is Mercer G. Rhodes' elevation to vice-president in charge of sales.

phia district sales manager, succeeding John C. Ruf, retired.

Owens-Illinois Glass Co., Toledo, Ohio, has appointed Claude W. Thomas, Jr., as eastern regional merchandising manager of Glass Container Div.

Worthington Pump & Machinery Corp. has appointed Harold K. Beck commercial vice-president. He will also continue as manager of Washington office.

Deaths

Reginald Dykes, 79, outstanding sugar industry authority and organizer of the American Sugar Cane League—Oct. 8.

Mrs. Charles B. Knox, 92, chairman of board of Knox Gelatine Co. and leader in food and grocery industries—Sept. 27.

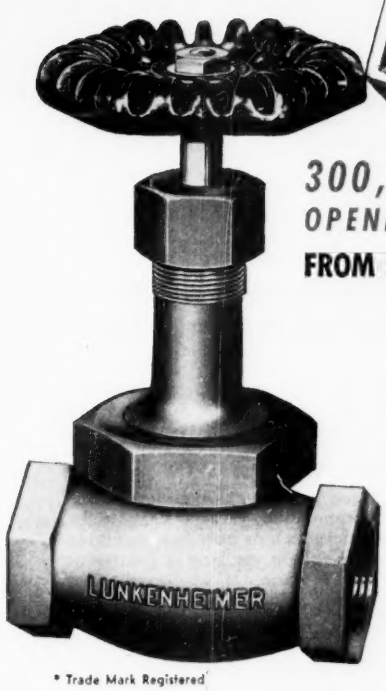
William J. Plews, 78, inventor of cereal puffing equipment and formerly with Quaker Oats Co.—Oct. 11.

Frederick W. Rickert 72 owner and president of Rickert Rice Mills, Inc., New Orleans—Oct. 7.

Thomas F. Smith, 59, executive vice-president and secretary of American Bakers Assn.—Oct. 21.

William B. West, 45, assistant vice-president of Beech-Nut Packing Co., Canajoharie, N. Y.—Oct. 21. —*End*

amazing
bronze stem gives
years of extra service



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300,000
OPENINGS AND CLOSINGS
FROM LUNKENHEIMER'S
Miracle Metal

Unbelievable? Perhaps, but Lunkenheimer's amazing new bronze stem metal has actually been tested at more than 300,000 openings and closings—the equivalent of years and years of rigorous service. Wear-test machines, carefully controlling torque and number of turns, have registered more than 300,000 cycles in the continuing tests—with live steam flowing through the valves. This stem has also been exhaustively tested under severe field conditions. Literally millions of stems have been placed in service, and not one has ever been returned due to wear failure. The remarkable stem metal, which has revolutionized all prior conceptions of valve stem life, is called Stemalloy*. It is a special-purpose bronze developed exclusively by Lunkenheimer, and is not commercially available. *Only Lunkenheimer valves* have the Stemalloy* stems. Ask your leading industrial distributor for information on the *complete* Lunkenheimer bronze valve line, or write The Lunkenheimer Co., Box 360Q, Cincinnati 14, Ohio.

BRONZE • STEEL • IRON

LUNKENHEIMER
THE ONE *Great* NAME IN VALVES

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MODEL HG-84 DUPLEX AUTOMATIC FILLING MACHINE

HIGH SPEED FILLING
LOW COST OF PRODUCTION

ON S&S AUTOMATIC DUPLEX FILLING MACHINE AT STANLEY HOME PRODUCTS INC., WESTFIELD, MASS.

On this machine the empty containers are fed on the intake belt and filled at the duplex filling heads. The filled containers are then carried away on the outgoing conveyer ready for closing. Speeds up to 60 per minute. Quantities up to 1 pound.

Stokes & Smith filling machines are available from single station to automatic tandem four station models to fill products such as powders, granules, flakes, etc., by gross weight, packing or volumetric measurement.

It will pay you to investigate S. & S. filling and packaging equipment for your requirements.

Write us for further information.

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PACKAGING MACHINERY — PAPER BOX MACHINERY

Subsidiary of Food Machinery and Chemical Corporation

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Books

Research Organization Analyzed In Management Treatise

THE THEORY AND PRACTICE OF INDUSTRIAL RESEARCH. *By David Bendel Hertz. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y., 1950. 385 pages; 6¼x9¼ in.; cloth. Price, $5.50*

Organization and management of research activities offer a very different kettle of fish when compared with the same two overseeing functions of other industrial departments. This book sets out to analyze the differences and discuss what can be done about them.

In the author's opinion, at least, the methods for managing research are, perhaps, little more effective now than they were 100 or more years ago. It is his view that the pattern of organizing and administrating a research group—from the solitary worker to the research team—is capable of rational analysis and the efficiency of these activities can be greatly increased.

The book covers fundamental requirements for research operations and illustrates how the best organization and structure may follow from an analysis of the elements and process. Specifically, the book progresses from a general discussion of the broad background of industrial research and the inception of research programs, to an examination of cost and time elements, personnel selection and administration, facilities, patents, and internal and external relationships.

The rather sesquipedalian style may get a bit tiresome at times, but the book is well organized and definitely worth careful study by management and supervisors in food research.

Accentuating the Negative

PACKAGING IN GERMANY DURING THE PERIOD 1939–1945. *Published by His Majesty's Stationery Office, York House, Kingsway, W. C. 2, London, England, 1950. 61 pages; 6x9½ in.; paper. Price, 2s.*

There may be a reason for offering this report for general publication, but you would have a hard time spotting it for anyone in the American food industry.

The book's introductory paragraph to the section on food packaging is typical of the whole report: "The conclusion reached on reading the reports of the various investigators who visited Germany after the war is that, with regard to food packaging, there is with few exceptions, little of interest to British industry." It's that way with American industry, too.

Everyday Engineering

PLANT ENGINEERING HANDBOOK. *Edited by William Staniar. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y., 1950. 2,007 pages; 6¼x9¼ in.; composition. Price, $15.*

Here is a book packed with information on the day-to-day problems that beset every industrial plant, including, of course, the food plant. It discusses plant organization, design, construction, operation and maintenance, aiming always at greater efficiency and economy.

The book covers the essentials of good practice in the mechanical, chemical and power areas of plant operation. Its tables, formulas, and graphs alone provide a rich source of basic data as well as quick reference information.

A quick glance through the book's 2,000 fine printed pages will convince you of its quantity. And its quality will be evident after a little longer glance through its list of 87 contributors, who represent 45 industrial organizations and 5 universities.

Food Components

COMPOSITION OF FOODS. *By Bernice K. Watt and Annabel L. Merrill. U. S. Department of Agriculture. Agricultural Handbook No. 8. 147 pages; 8½ x 10½ in.; processed. Free, from Department.*

This is a compendium that gives very complete details regarding the chemical composition and special nutrients of many types of foods. There are three tables of data, dealing with the edible portion of the food, the crude food as commonly purchased, and with the food as commonly used in the household expressed in house-

HERE AT STANDARD BRANDS (Fortification Headquarters) we're helping many of America's foremost processors give old products new life... create exciting new ones. And at amazingly low costs!

One of our technical men will be pleased to consult with you. No obligation! Special Products Division, STANDARD BRANDS INCORPORATED, New York 22, N. Y.

VITAMIN D PRODUCTS: Hy-Dee Irradiated Dry Yeast, Irradiated Dry Yeast Type 700-H, Viosterol (Irradiated Ergosterol).

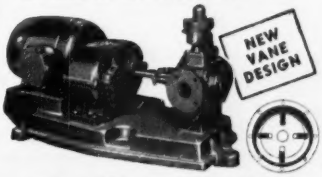
NATURAL B-COMPLEX PRODUCTS: Pure Primary Dry Yeast (brewers' type), Bee-Flex Products, Yeast Extracts, Yeast Extract and Liver, Fortified Yeast with Iron.

Fleischmann's

"First For Food Fortification"

MODERNIZE WITH *Liquid Material Handling* EQUIPMENT

Handling costs are controllable . . . downward . . . with Blackmer Pumps and piping wherever liquid materials are used in processing or compounding. Power pumps from 5 to 1500 g.p.m. are sized for any requirement.



HAND PUMPS FOR DISPENSING

Blackmer Hand Pumps promote safety, good housekeeping and economy.

Get "FACTS" about Rotary Pumps

Write for "FACTS." Latest designs, operating and service features.

BLACKMER PUMP COMPANY
GRAND RAPIDS, MICHIGAN

Faster, more efficient vegetable processing for large Eastern grocery

● This large chain store uses a Cyclone Flat Wire Stainless Steel Conveyor Belt to carry celery, spinach, beets and other fresh vegetables through a series of overhead sprays. The open type construction of this belt assures maximum drainage and removal of dirt. As all trimming and other processing can be carried on while the vegetables are on the belt—the time and expense of manual handling is eliminated and an hourly production rate is established.

Cyclone makes three types of belts—Flat Wire, Chain Link and Flex-Grid—one just right for your production system. For more information—get in touch with our nearest sales office and write for a copy of our catalog #4.

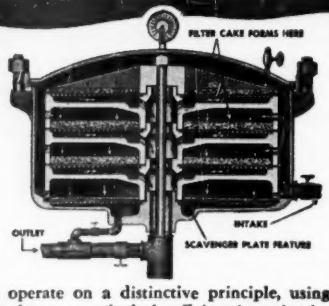
CYCLONE FENCE DIVISION
(American Steel & Wire Company)
DEPT. H-120, WAUKEGAN, ILL.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

CYCLONE METAL CONVEYOR BELTS
UNITED STATES STEEL

FOR HIGH SPEED, UNIFORM FILTRATION REQUIRED IN FOOD PROCESSING

SPARKLER horizontal plate FILTERS

Capacities 50 G.P.H. to 5000 G.P.H.



HERE ARE A FEW FOOD PRODUCTS THAT SPARKLER FILTERS HANDLE WITH EASE:
Candy Syrup
Chicken Broth
Cider
Egg Albumen
Extracts
Flavors
Honey
Gums
Liquors
Milk
Molasses
Vegetable Oil
Syrups
Vinegars
Wines
Fruit Juices
Alcohols
Alkalies
Beverages

Sparkler Filters operate on a distinctive principle, using horizontal plates, that are particularly efficient in maintaining uniformity in operation over a wide range of pressure, temperature, or viscosity conditions.

Filters water sparkling clear, removes all off-tastes, odors, color, sediment, chlorine, sulphur, algae, pipe rust, etc.

Because filter media are supported on a horizontal plane and filter aids floated into position uniformly, filtration takes place uniformly over entire filtering areas. Flow through filter is always with gravity. The patented scavenger plate filters the last drop, leaving no hold over in batch filtration.

We invite correspondence on your problems. You will receive the advice of filtration engineers with over a quarter of a century experience in a specific field.

SPARKLER MANUFACTURING COMPANY
MUNDELEIN, ILLINOIS

hold units, such as cups, ounces, and teaspoons.

In each of these tables are given data for the major components, such as protein, fat, carbohydrate, ash, and in most cases the water content and the food energy in calories. In all cases, data are provided for calcium, phosphorus, iron, vitamin A, thiamin, riboflavin, niacin, and ascorbic acid.

The document has been compiled over a period of years from published literature and unpublished information available both from the Bureau of Home Economics and other governmental and college laboratories. It is probably the most up to date compendium of such information available.

Government Publications

THERMAL EXPANSION OF SOLIDS. *By Peter Hidnert and Wilmer Souder. National Bureau of Standards Circular C486. Price 20c.* A large double-column document, this circular gives ten methods for determining thermal expansion and presents procedures used to obtain expansion equations and coefficients of expansion of materials.

CENSUS OF MANUFACTURES, 1947. *Three large quarto cloth-bound volumes sold separately: Volume* I. *General Summary. Price* $2.75. *Volume* II. *Reports for Industry. Price* $4.50. *Volume* III. *Reports for States. Price* $4.50. Includes all publishable data on factory output for the year, both general statistics and commodity figures.

These recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated the pamphlet is free and should be ordered from the Bureau responsible for its issue.

GLOSSARY OF CURRENTLY USED WAGE TERMS. *Bureau of Labor Statistics. Bulletin* 983. *Price* 15c. A convenient reference leaflet to assist in drawing wage and employment agreements.

COLLECTIVE BARGAINING PROVISIONS: (1) GRIEVANCE AND ARBITRATION PROVISIONS, (2) HEALTH INSURANCE AND PENSIONS. *Bureau of Labor Statistics. First named is Bulletin* 908-16. *Price* 35c. *Second named is Bulletin* 908-17. *Price* 55c. Quoted are typical contract agreements that have been reached with unions, and forms are suggested suitable for use in food-plant labor contracts. —*End.*

WHAT THE NEW YORK SEVEN-UP BOTTLING CO. INC. SAYS ABOUT *LIQUID SUGAR*

Our liquid sugar installation, made with the assistance of Flo-Sweet Engineers, has resulted in important—and regular—savings in manpower, as well as savings in much-needed storage space. And, in addition, we have virtually eliminated costly spoilage loss.

(Signed) JOSEPH YORK, *Vice President*
New York Seven-Up Bottling Co. Inc.

BEVERAGE MANUFACTURERS WHO USE FLO-SWEET® SAVE $ $ $ ON MANPOWER

When you replace 10 messy hand operations by 3 clean mechanical steps, you're bound to save on costly manpower.

The old-fashioned way, you pay for unloading bagged sugar at receiving platforms; loading on trucks, elevators or conveyors; moving bags to storage space; unloading and stacking bags; tearing down stock piles and reloading bags on stations; unloading, cutting and dumping bags; melting of sugar to produce syrup; and bundling, storage and disposal of empty bags.

HERE'S THE MODERN FLO-SWEET WAY

- **Receiving Department**—One man pumps Flo-Sweet through closed pipelines into your storage tanks.
- **Warehouse**—With Flo-Sweet, there is *no* labor needed.
- **Syrup Room**—Flo-Sweet f-l-o-w-s through sealed pipelines right into the mix. One valve to turn—mix measured automatically—no contamination loss.

  Flo-Sweet also cuts processing time: no waiting for dissolving, always an even mix.
- **Supervision**—With Flo-Sweet, there are *no* men needed.

When you get Flo-Sweet, you not only save on manpower, but you get increased production, less waste, and the assurance of the finest sugar to help make a cleaner and purer product.

flo-sweet

Manufactured only by

REFINED SYRUPS & SUGARS, INC.

Yonkers 1, New York

PIONEERS IN LIQUID SUGAR FOR SAVINGS, SANITATION AND SERVICE

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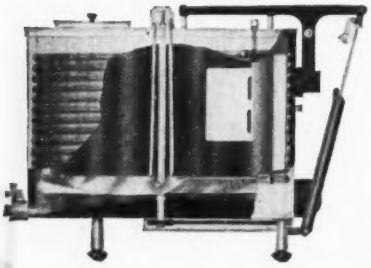

HEATING AND MIXING **Pfaudler Pressure Process "Lo-Vats"**

For products requiring efficient heating, holding, cooling or mixing, check these new Pfaudler stainless steel Pressure Process Lo-Vats! These insulated units are designed with a new type of spiral jacket (patent pending), tested at 250 psi. and include a manifold with multiple jets for heating with steam or hot water. May also be used for cooling with chilled water. Also with ammonia or Freon but not alternately with steam. Equipped with sweep-type demountable agitator powered by bottom drive. Capacities 100, 200 and 300 gallons. Vats of similar design also available in 500, 800 and 1000 gallons.

COOKING AND MIXING **Pfaudler Steam Jacketed Kettles**

Products which must be cooked or mixed are best processed in Pfaudler stainless-steel steam jacketed kettles. Designed for 100 psi. jacket pressure in accordance with ASME specifications, these kettles provide excellent service. Pfaudler single-motion anchor type agitator in combination with adjustable baffles create the equivalent of double-motion agitation. Practically any mixing requirement can be met at low cost. Capacities 35 to 300 gallons.

COOLING AND STORAGE **Pfaudler Refrigerated Tanks**

Most cooling and storage requirements can be met with Pfaudler's three types of sanitary Refrigerated Storage Tanks.

(1) Walled Cooled Type (Illustrated)—utilizes part of inner tank surface as cooling section. Efficient, compact, sanitary and easy to clean. Utilizes standard refrigerants.

(2) Spray Jacketed Type—coolant is sprayed under pressure over entire exterior surface of tank liner from spray pipe at top of tank jacket. Spray pipe easily removable for cleaning.

(3) Immersed Coil Type—can be installed in old or new tanks. Direct expansion stainless steel coil is located directly in front of tank agitator for maximum heat transfer. All tanks meet strictest Board of Health Sanitary Codes. Capacities to meet your requirements.

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- ☐ Steam Jacketed Kettles
- ☐ Refrigerated Storage Tanks

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Engineers and Fabricators of Food Processing Equipment

GLASS LINED STEEL · Hastelloy · Aluminum · Tantalum · Carbon Steel · Solid or Clad Stainless Steel · Nickel · Inconel · Monel

Equipment Catalogs, Bulletins

Handy Material Flow Equipment Outline A

Clever application tips, construction features and specification charts on gravity and powered conveyors, and hand and platform trucks are fully indexed in 24-page catalog. Both wheel- and roller-type gravity units, in steel and aluminum, are shown. Powered conveyors are offered in permanently-mounted or portable models, including a cleated-belt Floor-veyor for moving goods up inclines. The guided pallet conveyor, combining advantages of power and gravity, is presented for the first time.—*The Rapids-Standard Co., Inc., Rapistan Building, Grand Rapids 2, Michigan.*

Good "How-To" Tips on Steam Condensers B

A special 8-page engineering section, in 24-page Bulletin 102 on steam condensers, presents an easily understood method of picking the right size unit for your plant. Remainder of the booklet outlines data on installations, maintenance, air removal equipment and steam condenser specialties. Latter include injectors, air erosion eliminators, lights and port glasses, cleaning plugs, shock testers and leak detectors.—*Condenser Service & Engineering Co., Inc., Seaboard Trust Bldg., Hoboken, N. J.*

Enriched White Rice Raises Health Levels C

Better Health Through Better Rice, large format color-illustrated booklet of 36 pages, outlines steps in processing vitamin B_1-enriched white rice and briefs measures designed to improve the health of millions of people in the world's rice-eating nations. Specifically, it recounts the introduction of the enriched rice in Bataan, Philippine Republic, in October 1948, and the resulting saving of hundreds of lives and great reduction of beriberi symptoms in 90 percent of the persons fed the improved grain.—*Williams-Waterman Fund Research Corp., 405 Lexington Ave., New York City 17.*

Special Items in New Thermocouple Manual D

Application recommendations and important information on thermocouples and associated accessories, plus latest prices, are detailed in 42-page Bulletin TC-8. Standard line of thermocouples, protecting tubes, lead wire and insulators is completely described and specified. But among the many special items are resistance bulbs and wells, and a radiation detector. Wire sizes, resistances and temperature-millivolt curves are among the essential data stated.—*Wheelco Instruments Co., 847 W. Harrison St., Chicago 7.*

Food Plant Equipment

Dual Circulation Steam Generators E

Advantages claimed for the dual circulation steam generator over conventional boilers are listed in 16-page brochure. Installation data for high and low make-up plants are included.—*Foster Wheeler Corp., 165 Broadway, New York 6.*

Centrifugal Pumps F

Indexed in 16-page Bulletin 52B6059G are a wide variety of centrifugal pumps including close-coupled, pedestal, double suction single stage, self-priming, fractional horsepower, coolant and circulating, solids handling, marine, rubber-lined, sewage, axial and mixed-flow types.—*Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.*

Spray-Type Air Washers, Humidifiers G

Complete specifications and sizes of spray-type air washers, humidifiers and dehumidifiers are set forth in 24-page Bulletin 7. In addition, a rotary strainer is announced.—*Buensod-Stacey, Inc., 60 E. 42 St., New York 17.*

Processing Equipment H

Grinding, mixing, classifying, processing, heat exchange, hydrogenating and absorbing units are illustrated and described in 36-page Catalog CEC-49. It covers company's entire activities in field.—*The Patterson Foundry & Machine Co., East Liverpool, Ohio.*

Hand Control Oil Burners I

Capacities, mounting plates and dimensions of line of hand control oil burners are tabulated in 6-page Catalog 411. Schematic drawings show working components.—*Hauck Mfg. Co., 124 10 St., Brooklyn 15.*

Motor Starters, Air Break Contactor J

For the 2,300-5,000v. squirrel cage, wound rotor, synchronous and multi-speed motors, Type H motor starters are delineated in 12-page Bulletin 14B6410A. An air break contactor, adaptable for frequent starting, inching, reversing, plugging and dynamic braking, is discussed in accompanying 8-page Bulletin 14B7303.—*Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.*

Concentric-Cased Centrifugal Pumps K

Three pages of performance curves highlight 12-page Bulletin CP-749B describing line of centrifugal pumps which have concentric casings. Rpm.'s vary from 1,150 to 3,500.—*Mission Mfg. Co., P. O. Box 4209, Houston 14, Tex.*

Hammer Mills L

Four-page Bulletin H-5 describes line of hammer mills from 15 to 125 hp. Cyclone collectors are used.—*Bauer Bros. Co., 1740 Sheridan Ave., Springfield, Ohio.*

Recent Food Processing Equipment M

Low-temperature evaporation and drying, and vacuum rotary drying, solvent and by-product recovery equipment are described in 28-page Bulletin 355. Outline of company's testing services is given.—*Buflovak Equipment Div., Blaw-Knox Co., 1575 Fillmore Ave., Buffalo 11, N. Y.*

Free Literature—New Quick Way

Any of these very-latest catalogs, bulletins, circulars or folders will be sped to you gratis. It just takes a few seconds with a pencil. Suppose, for example, you want the literature marked "N" here on page 167. Simply take one of the special Reader Service postcards inside the front cover and circle the 167N Signs at the bottom and mail—no stamp needed. Then the material will be on its way to you.

Centrifugal Pump Data N

Specifications, ratings and dimensions on Monobloc centrifugal pumps, single- and two-stage, are presented in 20-page Bulletin W-306-B1. Data are very complete and cover five sizes and five types of pumps.—*Worthington Pump & Machinery Corp., Harrison, N. J.*

Sewage Ejector System O

Piping diagrams, equipment and advantages of a pneumatic sewage ejector system are contained in 12-page Bulletin S-50. It is claimed to be superior to a centrifugal submerged, or sump pump, installation.—*The Blackburn-Smith Mfg. Co., Inc., Hoboken, N. J.*

Synchronous Motor Starters P

Photographs keyed to line drawings explain the operation of Slipsyn starters for synchronous motors in 8-page Bulletin B-4379. New type ASR polarized slip-frequency field application relay is depicted.—*Westinghouse Electric Corp., 306 Fourth Ave., Box 1017, Pittsburgh 30.*

Filters Q

Operating cycle of filters, including precoating, filtering and cleaning, is clearly illustrated in 8-page booklet. Sizes, capacities and motors are indicated.—*Titeflex, Inc., 500 Frelinghuysen Ave., Newark 5, N. J.*

Dihedral Couplings R

Designed to handle misalignment up to 7 deg., new dihedral couple presented in 6-page Bulletin 50 does the job with minimum clearance and backlash. Credited is the dihedral-shaped tooth.—*Ajax Flexible Coupling Co., Inc., Westfield, N. Y.*

Grinding and Mixing Equipment S

Complete line of grinding and mixing equipment is particularized in 16-page Bulletin 265. Roller- and cradle-type jar mills, ball mills, drum rollers and mixing kettles are included.—

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TEXAS, P. O. Box 176

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There's a precision-accurate Detecto Scale for your specific weighing and counting need. The Detecto helps increase production, yet assures you maximum accuracy by making slightest weight discrepancies immediately visible.

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For increased production at lower cost! One operator with one Speed Scale does as much as two operators with ordinary scales. Sturdy, precision built, super-accurate. Ends overweight losses.

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SCALE ENGINEERS IN ALL PRINCIPAL CITIES

U. S. Stoneware Company, Akron, Ohio.

Hydraulic Motor Valve A

Four-page Bulletin 1080-A gives construction details, operation and capacities of new electrically-operated hydraulic motor valve, called Sarcostat.—*Sarco Co., Inc., Empire State Bldg., New York 1.*

Helical-Flow Dust Collectors B

Efficiency curves and general dimensions of controlled helical-flow dust collectors compose 6-page folder.—*Dustex Corp., 1758 Walden Ave., P. O. Box 188, Buffalo 21, N. Y.*

Materials Handling

Vibrating Conveyor C

Principles and operation of natural frequency vibrating conveyors are presented in 4-page Bulletin 950. Equipment is designed for use where there is problem in vibration transmitted to supporting structures.—*Stephens-Adamson Mfg. Co., Aurora, Ill.*

Feeders, Vibrators, Floats D

Pocket-size 44-page Catalog 506 is a picture index of company's equipment. It covers electric vibrators, vibratory packers, feeders, elevators, shakers and hammers, among others.—*Syntron Co., Homer City, Pa.*

Vertical Materials Movement E

Bulletin 28 deals with equipment for vertical movement in both storage and production operations. Illustrated are stackers, hoisters, portable cranes and working-height lifters.—*Lewis-Shepard Products Inc., 258 Walnut St., Watertown 72, Mass.*

New Delivery Truck F

Engineered to meet delivery problems in city and country, Model 3014 truck is depicted in 6-page folder. It has shorter overall length than conventional trucks of same capacity.—*The White Motor Co., Cleveland 1.*

Control Equipment

Laboratory Tables and Mills G

Six-page folder illustrates line of laboratory carts, tables and mills, including prices.—*Laboratory Construction Co., 1115 Holmes St., Kansas City, Mo.*

pH Electrodes H

Complete line of pH electrodes and assemblies for both industrial and laboratory applications are presented in 28-page catalog EN-S5. Publication is designed to help present users in ordering replacement parts, as well as to guide new users in selecting proper electrode.—*Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44.*

Liquid Level Indicators I

Complete details on liquid level indicators and auxiliary attachments are contained in 20-page Bulletin WG-1823. Auxiliaries include automatic control unit for distantly located signal lights, signal horns and electric switches.—*Yarnall-Waring Co., Mermaid Lane, Philadelphia 18.*

1-Min. Water Hardness Tests J

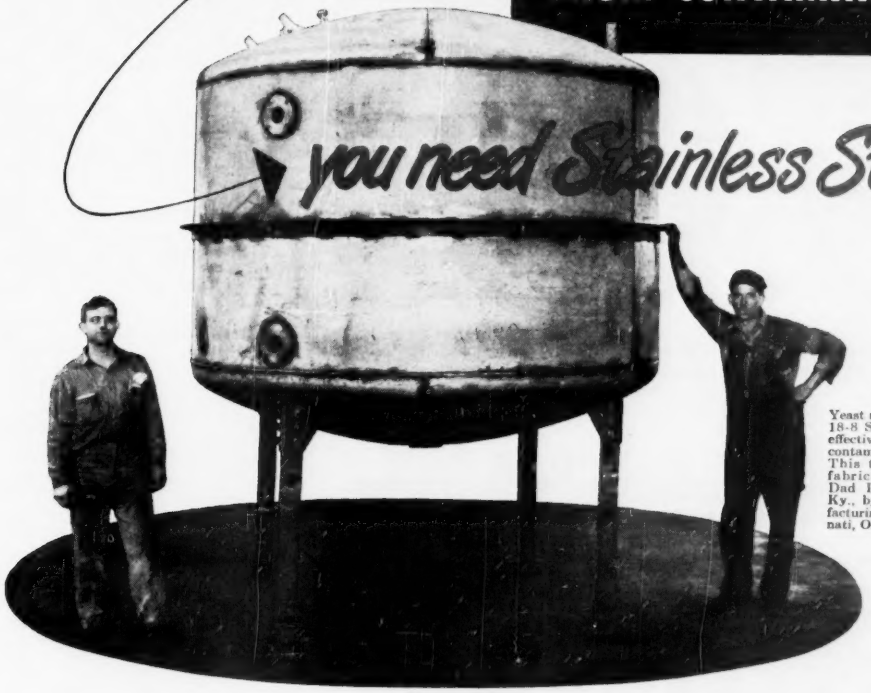
Procedures, reagents and equipment for the new 1-min. tests for determining water hardness are described in 4-page Bulletin 1RE50. Accuracy to within 1 ppm. has been demonstrated.—*Hall Laboratories, Inc., Hagan Bldg., Pittsburgh 30.*

Products for Bacteriological Lab K

Culture media, materials and apparatus for the bacteriological laboratory are listed in 152-

Wherever you need COMPLETE FREEDOM FROM CONTAMINATION

you need Stainless Steel



Yeast mixing tanks of U·S·S 18-8 Stainless Steel offer effective protection against contamination and corrosion. This tank is one of five fabricated for Old Grand-Dad Distillery, Frankfort, Ky., by The Stacey Manufacturing Company, Cincinnati, Ohio.

WHEREVER there's the least chance of product contamination, processing equipment made of U·S·S Stainless Steel will pay for itself over and over again. There's no reaction between Stainless and the food products with which it comes in contact . . . no losses chargeable to contamination.

Stainless won't affect food products and food products won't affect Stainless. Its exceptional corrosion resistance gives Stainless Steel long life even in the face of exposure to food acids usually corrosive to other materials. Stainless Steel's tough, durable surface never needs refinishing . . . it's the same superior material all the way through.

Food processors have found that these qualities of Stainless Steel . . . plus its ease of cleaning and permanently-attractive appearance . . . offset the sometimes slightly higher first cost of this more efficient metal.

No matter what you process, if you have problems of contamination or corrosion, Stainless equipment is a dividend-paying investment. And for the finest performance from Stainless equipment, be sure it's U·S·S Stainless Steel.

U·S·S Stainless Steel is available in forms, grades and finishes to meet almost every requirement. By specifying it, you make sure of getting Stainless Steel of the finest possible quality, specifically designed to meet your particular operating conditions.

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To meet every need exactly, there are 1458 different kinds of Colson wheels and casters—many of them engineered to meet the special needs of food processing plants. Long notable for quality that has made them the replacement choice of industry, they offer you big dividends in faster handling, easier work and reduced floor damage. It pays you to get the facts. *WRITE TODAY FOR FREE 68 PAGE CATALOG.*

Model No. 3-527-65 swivel fork caster, ideal for use on medium weight industrial equipment. Double row of ball-bearings in hardened raceways; heavy oversize king bolt, patented lock nut. Built for years of rugged service.

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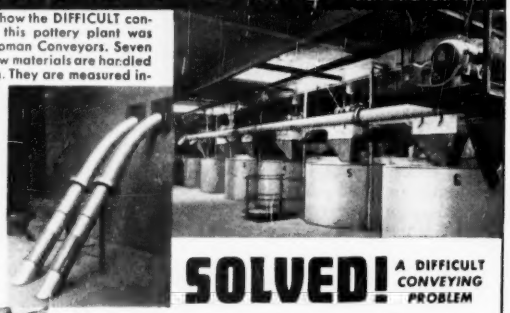
HAPMAN
TUBULAR CHAIN OR CABLE CONVEYORS

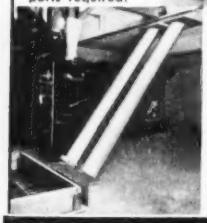
FOR FLOWABLE MATERIALS

U.S. Pats. & Pats. Pend.

These photos show how the DIFFICULT conveyor problem at this pottery plant was best solved by Hapman Conveyors. Seven kinds of ceramic raw materials are handled without intermixing. They are measured into hopper in lower photo and carried on 2 planes up 2 floors into Blunger room. Positive-discharge Hapman Vibrators used with rotary valves insure accurate volumetric discharge into any one of the 6 Blungers. Note small wall and floor openings and the minimum supports required.



SOLVED! A DIFFICULT CONVEYING PROBLEM



Here one conveyor must handle and keep segregated 7 types of material. The conveyor must be dust-tight and operate in more than one plane and direction without transfer points. There is only limited space for clearance and supports. Only Hapman Rubber-Flight Chain Conveyor was able to meet all these DIFFICULT requirements at the budgeted cost.

When confronted with *difficult* conveying problems, you'll probably find the answer in Hapman Conveyors. They are handling most types of flowable materials under one or more of the 45 *difficult* conditions which only completely "job-engineered" Hapman Conveyors meet successfully. Send for the Hapman catalog showing these materials and the methods used to handle them.

HAPMAN CONVEYORS, Inc. 630-a GIBSON ST.
Division HAPMAN-DUTTON COMPANY • KALAMAZOO 6, MICH.

page book. All culture media are given with formulas and prices.—*Baltimore Biological Laboratory, Inc., 1640 Gorsuch Ave., Baltimore 18, Md.*

Plant Supplies

Adhesives, Coatings, Sealers A

Properties of over 100 industrial adhesives, coatings and sealers are tabulated in 32-page catalog. Many find application in the food industry.—*Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.*

Rodenticide B

Rax powder, a warfarin-containing rodenticide that has proved excellent for controlling rats and mice, is described in 12-page booklet.—*R. J. Prentiss & Co., Inc., 110 William St., New York 7.*

Edible Oil Process Cleansers C

Three-page service report describes special materials and methods for faster, easier removal of soils from edible oil processing equipment.—*Oakite Products, Inc., 22 Thames St., New York 6.*

New Non-Toxic Cellulose Gum D

Physical properties, stability, compatability and suggested uses of a new water-soluble, non-toxic cellulosic, sodium cellulose sulphate, are detailed in 8-page booklet. It is seen of value as a stiffening agent in ice cream, puddings, pie fillings and salad dressings.—*Tennessee Eastman Corp., Kingsport, Tenn.*

Miscellaneous

Cleaning Materials E

Series of reference manuals telling how to maintain wooden, asphalt tile, terrazzo, rubber tile, concrete and linoleum floors is available. All phases of industry are covered.—*Multi-Clean Products, Inc., 2277 Ford Pkwy., St. Paul 1, Minn.*

Rubber Putty F

Recommended for glazing and sealing, and termed particularly suitable where vibration, corrosion or moisture exists, is "Plastikon" rubber putty, illustrated in 2-page Catalog Section 9765.—*B. F. Goodrich Co., Akron.*

Polyethylene Characteristics G

Summarizing the characteristics, development and latest applications of the flexible thermoplastic, polyethylene, is 24-page booklet.—*Bakelite Div., Union Carbide & Carbon Corp., 300 Madison Ave., New York 17.*

Visible Record Control H

Anyone interested in efficient maintenance of business records can secure many helpful suggestions from 80-page catalog titled *Kardex Visible Record Control.* It describes the various combinations of record forms and colored signal control methods.—*Remington Rand Inc., 315 Fourth Ave., New York City 10.*

Aluminum Finishes I

The 1950 edition of *Finishes for Aluminum,* 124 pages, not only supplies basic information on the various processes for applying surface finishes to aluminum, but also details characteristics of finishes so produced. Another feature is a guide for approximating typical costs of applying 20 different treatments to aluminum. (Because of limited supply, company asks that those interested in securing a copy of book support their requests with direct communications on their own company letterheads.)—*Reynolds Metals Co., 2500 S. Third St., Louisville 1.*

—*End*

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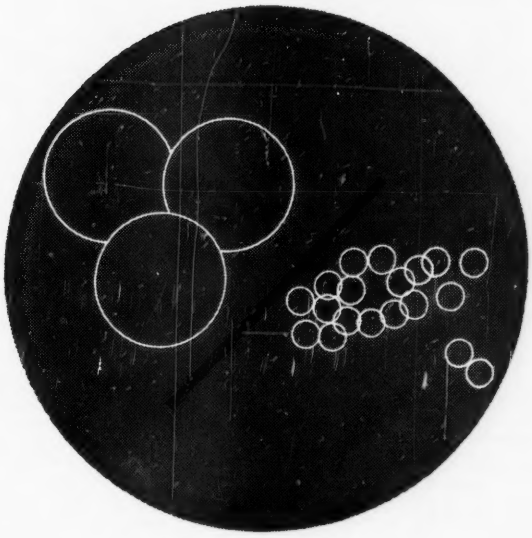

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Now for the first time—you can get truck, body, and refrigeration in one matched package! The new refrigerated Metros are completely equipped refrigeration trucks – International Harvester's from start to finish – factory engineered and factory assembled throughout.

Here is automatic refrigeration *plus* all the Metro body and International Truck chassis advantages that have made Metros the outstanding truck for multi-stop deliveries for so many years.

The new IH Motor Truck automatic refrigeration units maintain dependable temperatures as low as 10 degrees above zero in the well-insulated Metro bodies. Your frozen foods are protected during deliveries—or returned to the plant in the same good condition as if they had remained under plant refrigeration.

And you get all these Metro body and International Truck chassis advantages that pay off in more efficient, lower-cost *refrigerated* deliveries.

1. New Metro bodies offer larger payload capacities for peakload deliveries and longer routes. They offer lower floor height for easier loading and unloading.

2. The 4 new refrigerated models are part of the complete new Metro line ranging in GVW from 5,400 to 10,000 pounds.

3. New International chassis are *heavy-duty engineered* for lower operating costs, lower maintenance, longer truck life. You get the same heavy-duty engineered values that have kept Internationals first in heavy-duty truck sales for 18 straight years.

If you want to save money and worry on refrigerated frozen food deliveries, get all the facts now. Call or visit your nearest International Truck Dealer or Branch.

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Industrial Power . . . Refrigerators and Freezers

ALL NEW, ALL PROVED

INTERNATIONAL TRUCKS

INTERNATIONAL HARVESTER COMPANY CHICAGO

Patents

Flavor of Food Products Increased by Addition of Mixture of Ammonium Glutamate and Glutamic Acid—*D. B. Sabine, Yonkers, N. Y., to The Arlington Chemical Co. No. 2,512,385. June 20, 1950.*

Nuts Shelled by Action of Rotary Pressure Units Operating in Eccentric Manner—*A. S. Blankenship, Commerce, Tex., and F. F. Blankenship, Norman, Okla. No. 2,512,411. June 20, 1950.*

Liquid Foods Containing Easily Volatilized Flavoring Materials Concentrated by Application of High Vacuum, Fractional Condensation of Vapors to Obtain Condensible Flavor-Containing Content, Pasteurization, and Addition of Concentrated Flavor-Containing Condensate—*G. G. Zahm, Buffalo, N. Y., to Hurd Corp., New York City. No. 2,512,513. June 20, 1950.*

Bread and Like Shipped in Collapsible Crate or Carrier—*O. B. Denny, Charlotte, N. C. No. 2,512,522. June 20, 1950.*

Small Quantities of Chlorinated Water Freed of Excess Chlorine by Addition of Water-Soluble Salt of Hydrazodicarbonamidine—*H. C. Marks, Glen Ridge, and F. B. Strandskov, to Wallace & Tiernan Products, Inc., Belleville, N. J. No. 2,512,566. June 20, 1950.*

Potatoes Sliced, Topped With Carrot Slices, Subjected to Pressure and Cooked in Deep Fat While Held in Assembled Relation—*J. B. Alexander, Denver. No. 2,512,591. June 27, 1950.*

Raw Plant Tissue Stabilized Against Deterioration by Treating Exposed Surfaces With Peracid of Fatty Acid Series—*F. P. Greenspan and P. H. Margulies, Buffalo, N. Y., to Buffalo Electro-Chemical Co., Inc. No. 2,512,640. June 27, 1950.*

Chocolate Flavor and Essence Extracted From Cocoa-Bearing Material in Normal Acid Condition by Treatment With Water Solution of Edible Acids and Their Edible Acid and Alkaline Salts in Amount Insufficient to Destroy Acidity of Cocoa Material—*B. I. Masurovsky, Bronx, N. Y., to Choco-Essence, Inc., New York City. No. 2,512,663. June 27, 1950.*

Fatty Oils Recovered From Oleaginous Material by Percolation With Solvent and Horizontal Vibration to Increase Rate of Downward Flow of Solvent Through Material—*B. B. Beeson, to The French Oil Mill Machinery Co., Piqua, O. No. 2,512,710. June 27, 1950.*

Vegetative Crops Stabilized Against Oxidative Deterioration of Carotene Content by Application of Aromatic Amino Compound—*J. A. Chenicek, Riverside, Ill., to Universal Oil Products Co., Chicago, No. 2,513,002. June 27, 1950.*

Meat Tenderized by Action of Tissue Cutting Devices Mounted on Rotating Shafts—*A. L. Jackson to Hobart-Federal Engineering Corp., Minneapolis. No. 2,513,025. June 27, 1950.*

Cured Meat Stabilized Against Undesirable Color Change by Inclusion of Molecularly Dehydrated Phosphate in Curing Salt Mixture—*G. O. Hall, Murrysville, Pa., to Hall Laboratories, Inc., Pittsburgh. No. 2,513,094. June 27, 1950.*

Fruit Sliced by Action of Stationary Knives and Reciprocating Plunger—*V. Marasco, Los Angeles. No. 2,513,341. July 4, 1950.*

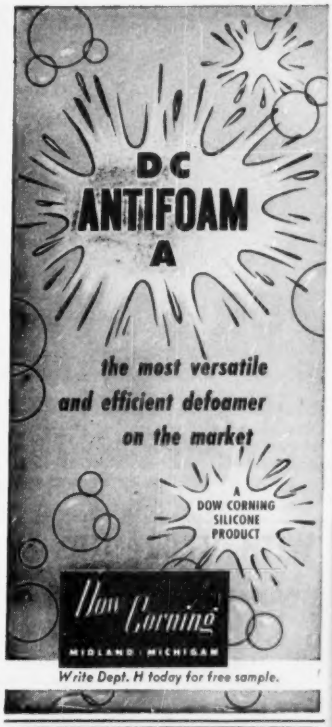
Gluten Phosphate Prepared by Reaction Between Gluten, Urea, and Phosphoric Acid—*H. S. Olcott and Ali Mohammad, Berkeley, Calif., to United States of America. No. 2,513,351. July 4, 1950.*

Eggs Mechanically Cleaned by Action of Endless Abrasive Belt Passing Over Concave Supporting and Shaping Block and Under Mechanically Held Egg—*L. W. Caldwell, Los Angeles; M. Caldwell, administratrix. No. 2,513,449. July 4, 1950.*

Food Units Packaged by Mechanically Applied, Gathered, and Stapled Wrapper Sheet—*W. Dodge, Salinas, Calif. No. 2,513,459. July 4, 1950.*

Candy Suckers Made by Automatic Forcing of Sticks Endwise Into Plurality of Candy Portions Arranged in Rows Parallel to Hoppers Containing Sticks—*C. L. Werner to John Werner & Sons, Inc., Rochester, N. Y. No. 2,513,609. July 4, 1950.*

Malted Grain Mash Separated by Centrifugal Force Into Sludge and Effluent in Two Steps: Screenings and Sludge From First Step Mixed With Fresh Water for Second Step Separation—*G. J. Strezynski, Poughkeepsie, N. Y., to De Laval Separator Co., New York City. No. 2,513,687. July 4, 1950.*



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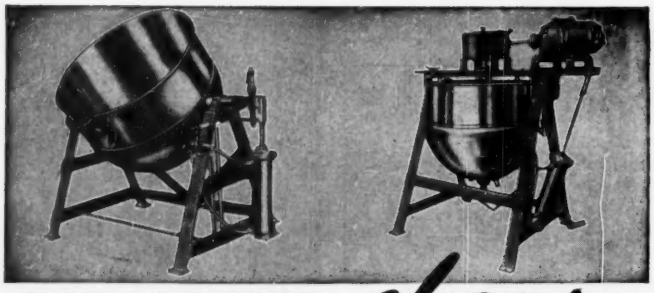

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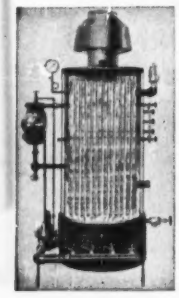

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Food Heat-Treated and Cooled During Passage Along Flat Surface of Heat Exchanger by Means of Rotatably Positioned Disks Having Spiral Grooves—*M. H. Switzer, Oak Park, Ill., and C. Olin Ball, Maumee, Ohio. No. 2,513,898. July 4, 1950.*

Edible Fatty Oil Stabilized by Addition of Small Quantity of Citric Acid and Heating Between 120 to 190 Deg. C. Under Pressure and for Sufficient Time to Convert Substantial Part of Citric Acid to Aconitic Acid and Aconitic Anhydride Acid—*F. A. Lindsey, Jr., and W. T. Maxwell, to Southern Cotton Oil Co., Savannah, Ga. No. 2,513,948. July 4, 1950.*

Dust Removed From Grain During Handling in Elevating Leg by Current of Air Delivered Through Conduit to Elevator Boot—*R. I. Patterson, Minneapolis. No. 2,513,963. July 4, 1950.*

Fruit and Vegetable Juices Extracted by Use of Machine Consisting of Masticator, Rotary Compressor Formed With Conical Helical Blade, and Whipper Blade at End of Helical Blade—*M. J. Thomas, Los Angeles. No. 2,513,974. July 4, 1950.*

Water-Containing Materials Desiccated by High Vacuum Applied to Material in Frozen State—*S. Bradbury, 3rd, Conshohocken, Pa., to Lyophile-Cryochem Corp., Baltimore, Md. No. 2,513,991. July 4, 1950.*

Cheese Made on Press With Ram Operating in Horizontal Plane Mounted on Frame Carrying Cheese Supports—*N. J. Peters to Damrow Bros. Co., Fond du Lac, Wis. No. 2,514,007. July 4, 1950.*

Food Products Canned Under Aseptic Conditions—*L. V. E. Clifcorn, Elmhurst, G. T. Peterson, Elmwood Park, and J. M. Boyd, Chicago, to Continental Can Co., New York City. No. 2,514,027. July 4, 1950.*

Starch Converted to Thin Boiling Class by Treatment With Water Solution of Mineral Acid and Hexavalent Chromium at Temperature Below Pasting—*D. W. Hansen to A. E. Staley Mfg. Co., Decatur, Ill. No. 2,514,055. July 4, 1950.*

Butter Made in Variable Speed Churn and Worker Parallelepipedonal in Shape and Supported at Opposite Corners to Permit Rotating About Diagonal Axis—*F. G. Cornell, Jr., Mountain Lakes, N. J., to General Dairy Equipment, Inc., Minneapolis, Minn. No. 2,514,375. July 11, 1950.*

Fruits and Vegetables Cleaned and Peeled in Continuous Manner by Action of Abrasive Disk Supported to Permit Rotation and Escape of Flushing Water and Refuse—*H. Reid, Hetherington, New Southgate, London, England, to Hobart Mfg. Co., Troy, Ohio. No. 2,514,493. July 11, 1950.*

Mixed Triglycerides Containing Saturated and Unsaturated Components Continuously Separated Into Fractions of Different Melting Points—*V. J. Muckerheide to Emery Industries, Inc., Cincinnati, Ohio. No. 2,514,608. July 11, 1950.*

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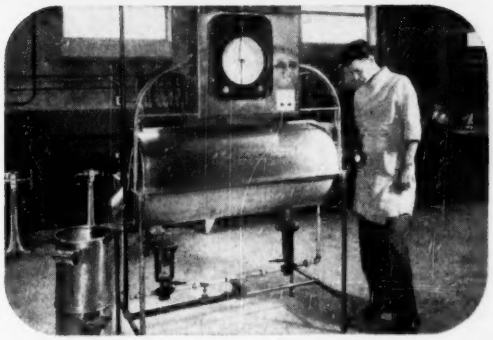

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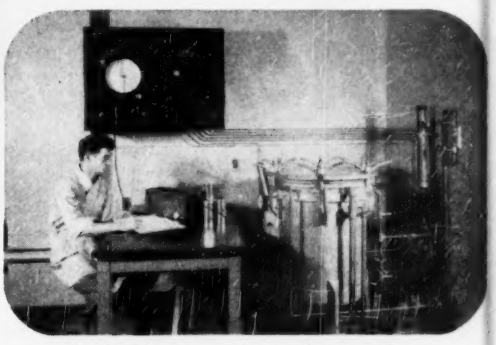

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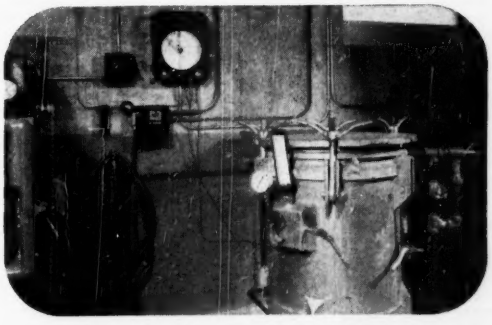
3. From the soil all the way to the consumer, NCA serves canners with specialized departments. Today, for example, NCA's Raw Products Bureau, working with the U. S. Dept. of Agriculture, gives Canners information that will help them grow better fruits and vegetables for canning. Home Economics educates the consumer on preparation and use of canned foods through magazines, newspapers, radio, television, and schools.



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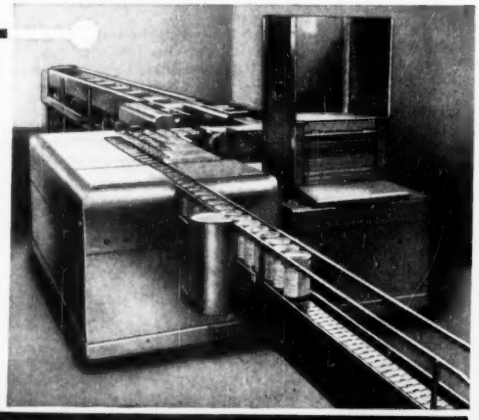

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Skin Removed From Long Sections of Sausage by Action of Counter Rotating Brushes Which Engage Casing and Strip it From Sausage in Helical Form—*E. R. McClure and A. L. McClure, San Diego, Calif. No. 2,514,660. July 11, 1950.*

Water-Containing Vegetable Materials Now Blanched by Action of Continuously Circulating Air in Closed System at Normal Pressure and Humidified by Moisture Evaporated From Materials Under Treatment—*Laszlo Vahl, Muiderberg, and A. W. Jansen, Rijswijk, Netherlands, to Central Bureau van de Tuinbouwveilingen in Nederland, The Hague, Netherlands. No. 2,515,025. July 11, 1950.*

Peanut Buttter Made to Contain Ground Smoked Dry-Salt Cured Pork Meat to Reduce Cloying and to Impart Palatable Flavor—*J. D. Gwaltney, Smithfield, Va. No. 2,515,036. July 11, 1950.*

Starches and White Dextrines Dissolved in Mixture of Water and Aliphatic Alcohol at Elevated Temperature, Separated Into A- and B- Fractions by Two Stage Cooling—*T. J. Schoch, La Grange, Ill., to Corn Products Refining Co., New York City. Nos. 2,515,095 and 2,515,096. July 11, 1950.*

Shrimp Deveined by Mechanical Means Equipped With Circular Guide Disks and Pair of Disk-Like Cutters—*R. K. Swinden, Houston, Tex. No. 2,515,101. July 11, 1950.*

Chocolate Raw Material Consisting of Cocoa Mass and Sugar Converted to Plastic Consistency by Pressure of 70 lb. Per Sq. In.—*K. C. S. Aasted, Gentofte, Denmark. No. 2,515,150. July 11, 1950.*

Corn Steepwater Treated With Aluminum Compound to Precipitate Phytic Acid and Recover Liquor for Nutrient Use—*G. W. Parsons to A. E. Staley Mfg. Co., Decatur, Ill. No. 2,515,157. July 11, 1950.*

Sugar-Containing Solution Refined by Treatment With Mixture of Magnesium-Containing Material and Combined Waste Products Resulting From Portland Cement Clinker Calcined at From 600 to 800 deg. C. for From 5 to 30 min.—*J. J. Naugle, New York City. No. 2,515,353. July 18, 1950.*

Rice Paddy Soaked in hot Water, Drained, Subjected to 25 lb. Steam Pressure, Exposed to 150 deg. F. air at Atmospheric Pressure, Then to 100 Deg. F. air to Reduce Moisture Content to 15 Percent by Weight Preparatory to Milling—*W. W. Jones and G. W. Brewer to Rice Growers Assn. of California, Sacramento. No. 2,515,409. July 18, 1950.*

Walnut Meats Bleached by Soaking in Solution of Alkali Metal or Alkaline Earth Sulphite at Between pH 10 and 11 For 2 hr., Draining, Neutralizing Residual Alkali, and Drying—*H. J. Almquist, Modesto, Calif. No. 2,515,625. July 18, 1950.*

Ground Roasted Coffee Extracted in Progressive Stages With 125-150 deg. C. Water to Obtain Concentrated Extract for use in Extracting Additional Ground Roasted Coffee at 25-15 deg. C.—*J. Ornfelt, Morristown, N. J. to American Home Foods, Inc., New York City. No. 2,515,730. July 18, 1950.*

Juice Expressed From Fruits by Action of Rollers Mounted on Parallel Axis Adjacent to Concave Sieve Members and Fitted With Scraper Knives to Remove Pressed Fruit Mass From Rolls—*D. A. Wallace, Grosse Pointe Farms, and R. E. Hewlett, Detroit, Mich., to Hewlett Mfg. Co., Detroit. Nos. 2,515,748 and 2,515,749. July 18, 1950.*—End

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Problem of Preference

—*Continued from page 44*

armed forces acceptance problems are quite similar to those encountered in producing for the civilian market. However, two factors might be pointed out which complicate the usual problems for the armed forces, although they do not require any basic changes in approach:

First, food for Services' feeding must be designed not only for the conditions approximating the civilian norm, but also for use under conditions which represent physical, physiological, and psychological extremes. Meals normally served at camps within the United States represent the former, while special purpose rations, such as for combat feeding, represent the latter. The influence of such extremes is an unknown in the acceptance equation and tends to make prediction even less exact.

Second, for reasons of economy and operational efficiency, a feeding program, or a ration, must be designed for an entire group. A new commercial product which pleases a small number—say 25 percent of the potential consumers—so that they buy it repeatedly, is considered a huge success. But a ration which pleases only 25 percent of the soldier-consumers is worthless to the military. A great many specialty items cannot be considered because of the necessity for pleasing the vast majority, and this need puts a premium on careful acceptance prediction for all rations.

But there is one condition which simplifies the Services' acceptance problem: Here, the consumer population is well-defined and is uniform in some of the most important characteristics. It is primarily male, young adult, and active. This will compensate in part for the difficulty represented by the other two factors.

Basic Research in Food Acceptance

At present, most food acceptance work is devoted to (1) problems of evaluating end products and (2) to a type of service work for research in describing and controlling the sensory properties of foods. Scientific knowledge of acceptance seldom aids in original design of foods; this is still empirical, the realm of the expert and the artist. If, however, there are natural laws which govern acceptance —and this seems certain—it should be possible not only to discover them, but also to use the knowledge to design acceptance characteristics into a food.

Present failure to achieve this end is due partly to lack of basic knowledge, also to poor organization and lack of confidence in what is known. These shortcomings create another area of interest for armed forces acceptance research. Investigations of the factors which affect acceptance, including those which pertain to the food itself, are underway at the Food & Container Institute and at outside laboratories under government research contracts.

Some of the major effects are known, such as climate, physical conditions under which food is eaten, physiological and mental states, and the whole gamut of food habits, training, and prejudices. But these effects have not been measured, their relative importance and their interactions have not been determined, nor do we know much about the variables which may operate within each major effect. Work completed and now in progress leads toward solution of some of these problems.

Gage of Appetite

The phenomenon of appetite has had considerable attention. The effects of various foods, exercise, vitamin deficiency, climate, emotional stress, and the administration of drugs have been observed. An important contribution has been determination of a relationship between taste and odor sensitivity and the momentary hunger-satiety state. It has been definitely established that most individuals are more sensitive when hungry and that subsequent loss of sensitivity depends upon the amount and kind of food eaten. The next objective in this line of research is to learn how to use this sensitivity index to evaluate foods.

The *modus operandi* of certain flavor agents is the subject of another phase of this basic work. It is usually assumed that all such agents are used to enhance acceptability, but it may not be known just how they bring this about, either the locus of the immediate sensory effects or how they are elaborated to positive acceptance behavior.

Monosodium glutamate is a good example. Work is underway to determine whether this substance actually stimulates all senses in the mouth, thereby causing a keener perception of flavor, as many of its proponents claim, or whether it is merely a blend of known basic tastes and adds a pleasant taste of its own, as does salt.

In conjunction with this work goes the task of evaluating, by carefully controlled experiments, the effects of the substance upon consumer preference. An interesting finding in this area of flavor investigation has been that natural black pepper, in a great many of its normal usages, has no effect on acceptability of foods as measured by general consumer preference.

A-Ration Targeted

Food attitude, which is the resultant of a number of factors such as habit, training, social influences, personal opinion, and prejudice, is at present the subject of a series of studies that are of practical interest to the Army's Food Service Division, and also are theoretically significant. The immediate objective is to obtain some knowledge of relative acceptability of the foods included in the master menu of the Army's A-ration.

A method has been established for this purpose. It utilizes a simple questionnaire in which the respondent indicates his degree of liking for no more than 45 foods at one time, the number being limited to avoid the dangers inherent in long questionnaires. Respondents are a probability sample of enlisted men drawn from the Army camps throughout the United States. A series of questionnaires are required to cover the 400-odd foods and recipes included in the master menu. Two segments of the study have been completed, and results have been satisfactory.

Not only will these studies enable the Food Service Division to alter the master menu toward economy and efficiency, but they will also be a fund of significant theoretical information. Later studies in the series will go beyond the basic "like-dislike" question.

Here are two paths research might profitably follow: Take, first off, the elusive problem of monotony, where almost nothing is known beyond the simple fact that continued usage of some foods in certain situations tends to lower their acceptability.

Even to determine the true nature of this effect, to encompass the problem in a limited number of concrete propositions, thereby making it more accessible to research, might be no mean achievement. But more is needed. We must discover general principles governing this loss of acceptability, determine what proportion of it can be attributed to factors in the food and what proportion to training or other factors in the individual. Also we must devise means of anticipating the incidence and the extent of this negative influence.

It is apparent that a first approach can be study of the shifting patterns of attitude during development of monotony. Beyond that, the research area presents a large question mark.

The second problem concerns rations to be provided for survival in emergency situations. This is almost exclusively a military matter. What sort of acceptance characteristics are desirable in such rations? Should they be made pleasant, in order to boost morale and to insure full utilization? Or should they purposely be made drab

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or even unpleasant to discourage their use until hunger creates extreme motivation? Perhaps acceptance should not be considered at all, and they should be designed wholly for physiological value.

This whole range of theorizing is carried over into the design of the various survival rations now in use. The great obstacle to progress has been the difficulty of obtaining reliable information regarding human behavior toward food under physiologically and emotionally extreme conditions such as are expected in survival situations.

It is impossible to get accurate field reports. Most laboratory work has been done on animals. Hence, educated guesswork must stand in lieu of actual information. Again, here is a research problem where the field is wide open.—*End* *(Resume reading on p. 45)*

Bottlenecks Licked

—Continued from page 41

There are two sets of precook kettles and cookers—one for making lollipops, candy drops, and striped or fruit-filled pieces, the other for producing the popular Charms' hard candy tablets.

One set of three kettles is used for cooking all varieties of hard candies except the tablet-shaped confections. Each kettle handles a 700-lb. batch. After a batch is cooked to 230 deg. F., it is gravity fed to a stainless steel tank that serves as a holding unit to permit continuous operation of the vacuum cooker. This continuous cooker, operating under 90 lb. of steam pressure and 28½ in. of vacuum, handles a 250-lb. batch every 6 minutes.

As soon as a batch is cooked, the vacuum is released from the kettle and the candy is poured into one of two stainless steel receiving bowls. Next, the candy is dumped onto water-cooled slabs, where color and flavor are added. Then, the cooled candy goes to forming machines to be shaped. Cooling and packaging follow.

Another set of six copper kettles is used to prepare the all-sugar tablets. Each kettle feeds a 300-lb. batch of candy into a Charms' batch-vacuum cooker.

Here's how this cooker operates:

1. Candy is drawn under vacuum from a precook kettle and goes into the cooker (precooked candy is not pumped at this stage because the sugar would grain).

2. The batch is cooked under atmospheric conditions. Temperature of the cook is automatically controlled to produce uniform batches.

3. A high vacuum is then applied to increase the hardness of the batch without using additional heat.

4. The vacuum is released and the candy is transferred onto water-cooled slabs.

Color, flavor, and fruit acid are added and mixed into the candy as it slowly cools.

Tablets Machine-Formed

Invention of high-speed tablet-forming machines was the third notable improvement. Each unit takes a strip of candy and stamps it into tablets at the rate of 1,000 per min. Let us take it from the beginning:

After each batch of candy has cooled sufficiently, it is loaded onto an automatic batch spinner that forms it into a roll tapering at one end to 2 in. dia. Next, the candy goes through a series of sizing rolls that gradually reduces it from the 2-in. dia. rope to a ¼x¾-in. strip. Another function of the sizing rolls is to break up air bubbles in the candy.

The strip of candy then goes to the tablet-forming machine. Here, the strip is fed under a rotating disk with cut-outs or dies that are the size and shape of the piece of candy to be formed. These dies are around the periphery of the disk. And, as the candy is squeezed beneath the disk, it is forced up into the dies.

Plungers on each side of the disk form square ends on the pieces of candy in each die while the disk rotates. The plungers then retract, releasing the tablets, which then drop onto a chute that feeds them upon a wire-mesh belt going through the special cooling room. The size of the tablets leaving the forming machine is $^{3}/_{4}$x$^{3}/_{4}$x$^{3}/_{8}$ in.

Because of the high speed at which the forming units operate, considerable heat was initially generated, causing the machines to jam. But, by installing air jets on these machines, they are now cooled sufficiently to prevent such breakdowns.

Fourth change for better efficiency has been the construction of a double-tier cooling belt in a cork-insulated, air-conditioned room, where the temperature is kept at 65 deg. F. and the relative humidity at 45 percent. By cooling candies under these ideal conditions, the company is enabled to maintain year-'round production, despite any adverse changes in the weather.

From the cooler, a specially designed bucket conveyor carries the tablets to a horizontal rubber belt on the floor below.

Continuous mixing of the assorted-flavor candy tablets is the fifth change enabling stepped up production. Formerly, the preparation of a uniform assortment was a laborious, time-consuming job. But now, with the installation of a new mixing belt, the different varieties of tablets are automatically assorted as they are fed at stations all along the line, and they are finally collected in 50-lb. tote pails at the end of the horizontal rubber-belt mixing conveyor.

Provision has also been made to permit attendants to collect one variety of candy at a time. In this operation, a metal baffle plate is placed across the belt to divert the candy directly into tote pails.

Faster Packaging

Sixth development—the tablet-wrapping machine—is a very significant advance. There are over 50 of these units, each capable of wrapping 300 candy tablets a minute in cellophane (See p. 112, Oct. '48 FI)

This machine does a triple packaging job. It first wraps each tablet in cellophane, which is then heat-sealed. Next, it automatically stacks the tablets in groups of ten. And then it overwraps each ten-tablet unit in a printed, laminated foil wrapper that is heat-sealed. Finally, the 5c.-size packages of candy are packed into display cartons that are overwrapped with cellophane and heat sealed—*End* *(Resume reading on p. 42)*

GF's New System

—Continued from page 48

and released, when it is forwarded to the central billing office.

When traffic department employees receive the car number from the warehouse for an order on which loading has begun, they complete the preparation of the bill of lading covering the movement to the break-bulk point. Then they apply the transit billing, post their transit records and prepare the individual bills of lading covering each customer's portion of the pool car.

These individual bills of lading are sent to the warehouse to be placed in a manila envelope within the car, so that they are available to the distributor when he unloads the car at the break-bulk point. The original two copies of the bill of lading, and a transit shipping direction showing, for the convenience of the carriers, the inbound and outbound rates and charges for every freight classification group, are submitted to the carrier for signature.

A copy of the carload bill of lading is sent to the district office, as a shipping notice, on the same day the car is shipped. Also a copy is mailed at the same time to the pool car distributor, with written instruction

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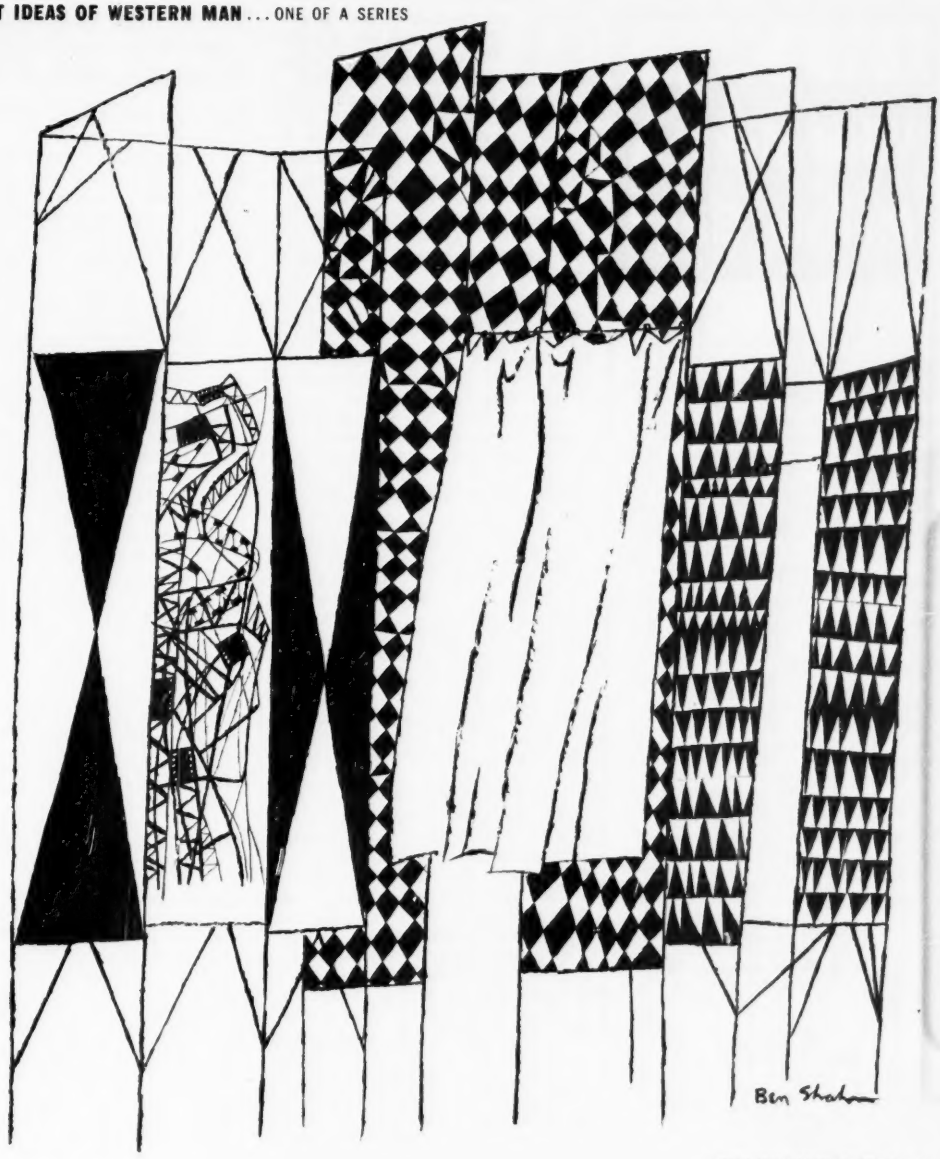

"THE VOTING BOOTHS": BEN SHAHN

John Locke
on the purpose of government

The end of government is the good of mankind ... and which is best for mankind, that the people should be always exposed to the boundless will of tyranny, or that the rulers should be sometimes liable to be opposed when they grow exorbitant in their power, and employ it for the destruction and not the preservation of the properties of the people?

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covering the handling of the car. In the case of mixed cars for a single customer, the original bill of lading is mailed to the customer.

Freight cars vary in length, width and height. Even conventional 40-ft. boxcars may range from 2,700 cu. ft. to 4,000 cu. ft. The superintendent, with perhaps 15 carload orders to be filled that day—no two of which have the same cubic foot displacement—is faced with the job of selecting the correct size car for each of the orders. And he must make his selection from the group of cars unloaded that day. Physical condition of the cars must also be considered, as must the possibility of routing the car in the direction of the owning road, which the superintendent always tries to do.

After selection, the car is inspected, cleaned, repaired if necessary, nails pulled or hammered in, walls lined with paper if they are rough, and the floor covered with waterproof paper or corrugated board when needed.

Crews to load the outbound cars are then selected by the foreman. One of four copies of the loading tally is given to the checker, who heads up the crew, another to the fork truck driver, and a third to the stock picker. The fourth copy goes into the manila envelope for the distributor. The checker notes the cubic foot displacement of the load and determines how high the car must be loaded at the ends to make the completed load level and tight throughout.

It is the stockpicker's job to select from the "pick" line the less-than-full pallet quantities and to place them at the end of the pick aisle, ready to be brought to the car door by the fork truck driver. The fork driver takes the full pallet loads from the stock piles and positions them alongside the partial pallet loads at the car door.

Now the checker gets going, moving the pallets into the car with electric power jacks, making them available to the carloaders. He checks off the commodities as loaded. When all commodities on the loading tally have been brought to the car door, the driver, picker, and checker pitch in with the two carloaders to complete loading job.

Metal strapping is applied to hold the load in place. Then corrugated sheets with steel banding are fastened across the door, the papers placed in the manila envelope, and the car closed and sealed.

The aim in developing this system was better service to customers. Results to date, based solely on that aim, have been more successful than many of us dared hope. And better service to customers has never yet failed to pay increasing dividends in many forms, over long periods.

End (*Resume reading on p. 49*)

Gravity Does Unloading

—*Continued from page 79*

hotels and restaurants in Chicago and the surrounding territory.

The Air-O-Flex Equipment Co., which installed the Irondale unloader and weighing scale, also manufactures a line of small truck unloaders, with or without weighing scales and with or without pits. It also makes a combination small truck and large-tractor-trailer dumper, which is, in reality, a dumper within a dumper. Here the tilting platform for the small trucks is built within the platform of the large dumper.

In the combination model there are two sets of hydraulic cylinders, each set entirely independent of the other and each operated by a separate operating and control valve. When a small truck is to be dumped, the small platform is tilted upward by its own set of cylinders and the large platform remains in place in its horizontal position.

When a tractor-trailer is to be dumped, the large platform is tilted, carrying with it the small truck platform in its down and normal position, together with the small platform lifting cylinders telescoped into metal shields in the shape of truncated cones located on the outside of the large platform.—*End.* (*Resume reading on p. 80*)

Did It Thaw?

—*Continued from page 84*

characteristics of the indicator be capable of modification to meet the specific requirements of different foods.

Many types of thawing indicators have been devised. Several of these have been described recently by A. A. Anderson (Food Technology 3, 357-8; 1949). They range from a simple ice design, which loses its form when thawed, to much more complex devices.

However, a thawing indicator has now been devised that is believed to be superior to those proposed heretofore in that it shows the degree of exposure to thawing conditions and it may be adjusted at the time of manufacture to suit the varying requirements of different products.

The principles on which this indicator functions are well recognized in the frozen food field. The action is very similar to what happens with frozen peaches when they darken upon exposure to air and thawing. This

FACTS ON FILTERING

Representative case histories on widely varied clarification problems condensed from field reports of Johns-Manville Filtration Engineers

Hyflo Makes Apple Pressing Easier

(reported by J-M Eng. F. D. Richards)

CINCINNATI DISTRICT: During my first call on this customer, I recommended the use of 2% Hyflo Super-Cel as a pressing aid in their apple pulper.

Recently, when I called again, they informed me of their results. Ordinarily, with the kind of apple they are using at present, the press cake is squashy and slippery. With Hyflo, the cake is much firmer and they are able to operate the press at a higher pressure. This, according to their estimate, has increased the juice yield by approximately 5%.

Although with other types of apples, no increase in yield has been noted, the addition of Hyflo does permit easier stripping of the cake, and this advantage alone is sufficient to justify its use.

Sales Appeal Improved with Celite 545

(reported by J-M Eng. W. A. Reschke)

CHICAGO DISTRICT: A trial run convinced this customer that he had much to gain and nothing to lose by using Celite as a pressing aid in making jelly from frozen grapes.

The equipment used was a vertical hydraulic press. Previously, without Celite, the centrifuges had to be cleaned 3 times a day. With Celite, they required cleaning only once a day. Customer also noted that the cloths were in better condition after pressing with Celite. Production of juice remained about the same, but the jelly was much clearer—it had better sales appeal—and judging from its appearance, a much longer storage life could be expected.

These advantages were obtained by the addition of 20 pounds of Celite 545 to each 900-lb. batch of grapes pressed.

$3 Bag of Super-Cel Returns $57.40 Profit!

(reported by J-M Engineer H. G. Martin)

Recently, one of my customers phoned, asking if we could increase their grape pressing yield in gallons of juice and in time saved. If so, they wanted me to show them how to do it.

They place 192 lbs. of Concord grapes in a steam-jacketed cooker, stems and all, with about 1 gal. of water. Steam is applied, and after cooking, the free juice is drained from the bottom.

Before the juice was drained, I added one pound of Hyflo Super-Cel (about ½% by weight of grapes) and stirred it throughout the mass. After a thorough stirring, the mixture was placed in cheese racks under the hydraulic press.

Previously, without Hyflo, the pressing operation had taken 16 minutes. With Hyflo, the press closed completely, producing a dry cake in nine minutes. Instead of requiring a total pressure of 1100 lbs. psi, the press was finished at 600 lbs. psi. There was no slippage of the frames, the cloths cleaned better, and there was no breakage of cloths. In addition to this, the final yield of juice was so much greater that each $3.00 bag of Hyflo used resulted in an overall profit of $57.40.

Needless to say, the use of Hyflo will not stop with the grape presses, but will be standard for all their fruit jelly juices.

Gets Premium Price for Strawberry Juice Filtered with Celite 545

(reported by J-M Eng. Scott Robbins)

A few months ago, one of my customers purchased a 26 sq. ft. filter to be used in reclaiming syrup used in the treatment of maraschino cherries.

At the particular time the filter arrived, strawberries were in season, and they put it in operation on strawberry juice using Celite 545. The new filter did an excellent job, and they were able to get a premium for this juice from the jelly manufacturer.

In fact, customer was so pleased with the results obtained that they are planning to extend the use of Celite to many of their other operations.

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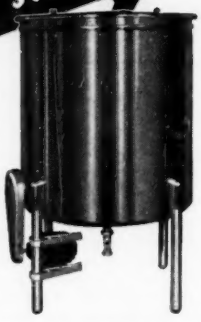

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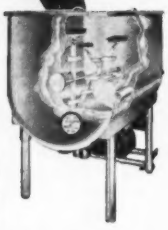

◊ Type "CHR" is a jacketed tank for heavy or light processing, for cooking or cooling, and equipped with the famous horizontal "wiping action" agitator.

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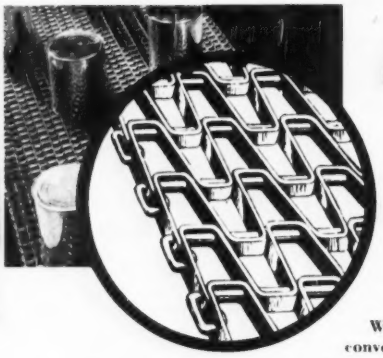

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brown color development may be inhibited by the addition of ascorbic acid (vitamin C), the extent of inhibition being a function of the concentration of ascorbic acid. The color change is caused by the oxidation of phenolic compounds in the peach; the presence of atmospheric oxygen and an oxidizing enzyme system as a catalyst are essential. The antioxidant properties of ascorbic acid enable it to control the rate of color development.

The thawing indicator consists of a gelatin gel enclosed in an oxygen-permeable transparent envelope. Present in the gel are an oxidizing enzyme, a colorless phenolic compound capable of being oxidized to a dark color, and a suitable concentration of ascorbic acid, which will regulate color development at a desired rate.

The manner in which exposure to thawing temperature alters the appearance of such an indicator is shown in the accompanying photos. And effect of ascorbic acid concentration on rate of color development is illustrated by data in our table.

By making foods damaged by thawing readily recognizable, such an indicator can serve to fix responsibility when the foods have been improperly handled or stored.

The indicator described here was developed under a contract between the School of Nutrition, Cornell University, and the Office of Naval Research, U. S. N.—End (*Resume reading on p.* 85.)

Time Limit Vital

—Continued from page 55

Eating quality scores (Fig. 2) apparently were influenced more by flavor and aroma than by texture, although it was observed that good flavor and good texture were related.

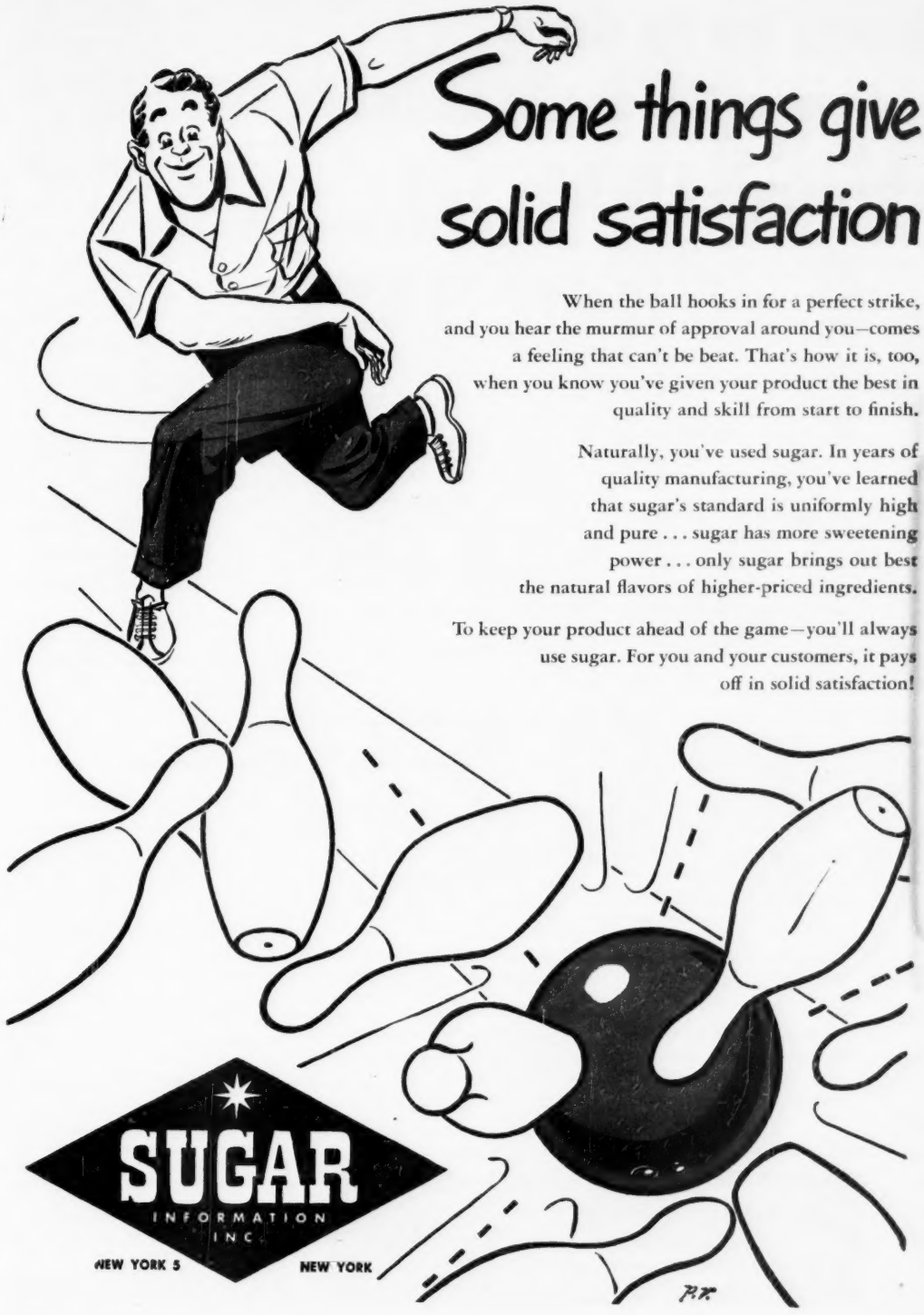
It is evident that all cakes decreased in quality with increased storage time of mixes. But quality of laboratory-temperature mix cakes decreased most rapidly.

The total palatability scores (Fig. 3) of the control cakes and those made from refrigerator-temperature stored mixes were within 3 points of each other through the 20-week period.

Note that in all three scorings, presence or absence of shortening in the mixes made only negligible differences.

What They Decided

It is concluded that under the conditions of this study, mixes can be stored at room temperatures for a maximum of only 7 weeks and still produce acceptable cakes. In con-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★ "Juice Color is Bettered by a Gas Blanket". *Nitrogen blanketing of fruit pulping operations. Applicable to vegetable products.*

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trast, mixes held at refrigerator-temperature may be stored for a maximum of 20 weeks and produce acceptable cakes.

Storage temperature was found to be the main factor affecting shelf life. Shortening had no appreciable effect.

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This article was taken from the paper, Contribution No. 160, Dept. of Home Economics, Kansas Agricultural Experiment Station, condensed from MS-degree thesis by Louise L. Wherry, 1950.—End *(Resume reading on p. 56)*

'Scope Conveyor

—Continued from page 45

veyor that could be rolled to the stairs, from a subway-level storage room, and then raised through the stairwell up to the street. This equipment is now doing the job, whisking baked goods down, bringing empty trays back up.

About the Conveyor

The tailor-made conveyor is mounted on four casters. It comprises a steel carriage upon which there are six 15½-ft. long telescopic sections—one fixed and five extendable. These sections are equipped with a 12-in.-wide grip-type rubber belt that winds around a 24-in. dia., manually operated reel when the conveyor is retracted for storage. The reel tightens the belt to keep it from slipping while the conveyor is running.

Directly behind the pivot-section of the belt are two drives. One runs the belt; the other operates the telescopic sections. There are also two sets of "up-down-stop" pushbuttons. The first

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set is for the telescopic sections, and the second is for the main-belt drive.

When extended, the conveyor is a full 93-ft. long. And when contracted, it measures a compact 18 ft.

After the trucks of baked goods arrive, the conveyor (in retracted position) is rolled to the bottom of the stairs, where the assembly is first raised, by means of its integral hydraulic jack, from a 10 to a 23-deg. angle. Next, five hinged, 1¼-in. pipe supports are placed on the stairs, 15 ft. apart, to keep the sections in position. Then, an electric-winch cable pulls out the sections to the head of the stairs.

Trayloads of fresh goods are then conveyed from the street to the subway level. And after all goods are delivered, movement of the belt is reversed and empty trays are returned.

It takes 15 min. to set up the conveyor. This is done twice a day—once for the 6-7 A.M. shift, and then again for the 10-11 A.M. shift. During each period, the conveyor is in operation for an hour.

Four men run the conveyor. A man on street-level feeds trays onto the belt. Another in the center of the stairwell guides them, when necessary. And two men on the subway-level unload and operate the machine.—*End*

(*Resume reading on p.* 46)

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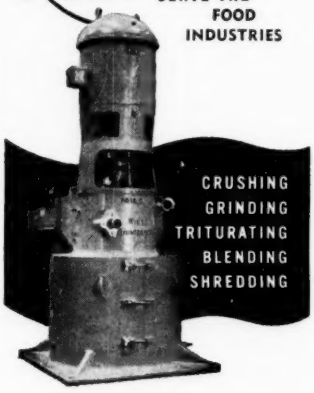

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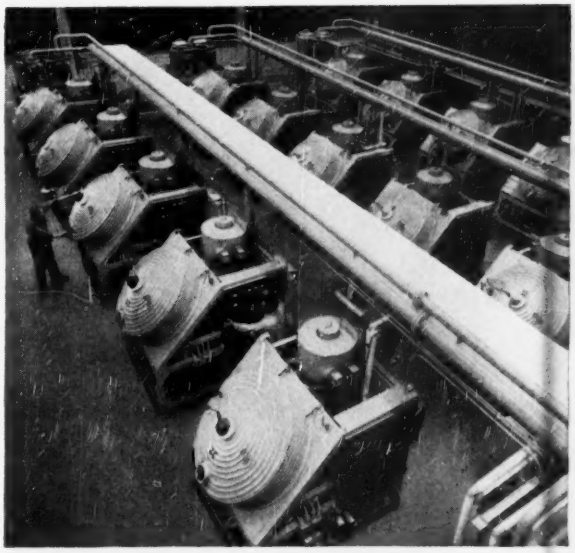
natural or synthetic

vitamin A

for the best of foods and pharmaceuticals



These banks of DPi's unique molecular stills separate from fish liver oils the blandest and most stable of natural vitamin A concentrates.

WHEN you need the best in vitamin A, you have but one thing to remember. Simply this: Whatever your vitamin A requirements—natural *or* synthetic—*deal with DPi!*

In natural form—DPi Distilled Vitamin A Concentrate. DPi's molecularly distilled vitamin A is the finest obtainable for use in pharmaceutical or food products. This is a result of DPi's world-wide sources for natural fish liver oils—and a modern plant for continuous, large-scale refining and molecular distillation. *Here rigid quality controls assure you that there is no concentrate from natural materials more taste-free and stable.*

In synthetic form—Myvax 16 Synthetic Vitamin A Palmitate. In 1948 DPi offered on the American market the first synthetic vitamin A available in commercial quantities. Since then, it has been in continuous successful production. It has a pleasant but exceedingly faint taste and odor. Ideal for use in high-potency preparations.

To help you. As producers of the best in natural and synthetic vitamin A, we like to see it traded as an accurately characterized, precisely measured commodity. A long step forward in that direction, we believe, is the new assay method for vitamin A in the recently issued Fourteenth Revision of the United States Pharmacopeia. So to help all vitamin A buyers understand completely the background and implications of this method, we have issued a booklet called "U.S.P. XIV and the Vitamin A Business."

For your copy, or for the latest quotations on either natural or synthetic vitamin A, write, wire, or call ***Distillation Products Industries,*** 723 Ridge Road West, Rochester 3, N. Y. (Division of Eastman Kodak Company). Sales offices: 570 Lexington Avenue, New York 22, N. Y. • 135 South LaSalle Street, Chicago 3, Ill. • Gillies & Loughlin, Los Angeles and San Francisco • Charles Albert Smith, Ltd., Montreal and Toronto.

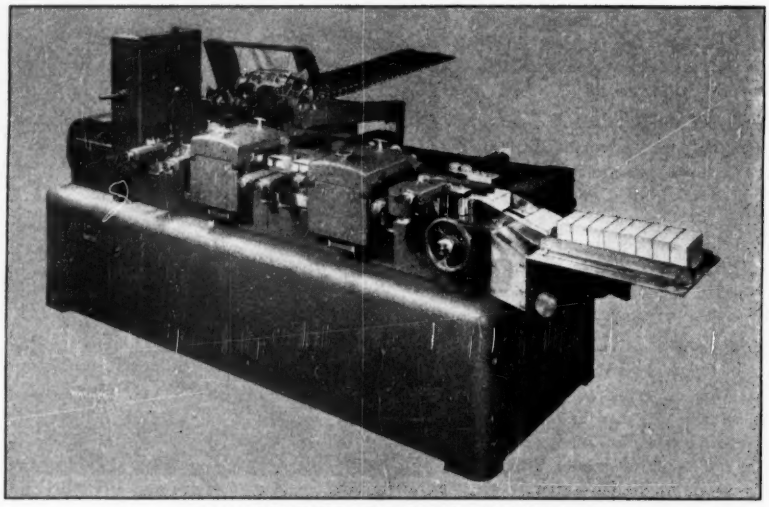
"Myvax" is a trade-mark.

DPi

leaders in research and production of vitamin A and vitamin E

Also...high vacuum equipment...distilled monoglycerides...more than 3300 Eastman Organic Chemicals for science and industry.

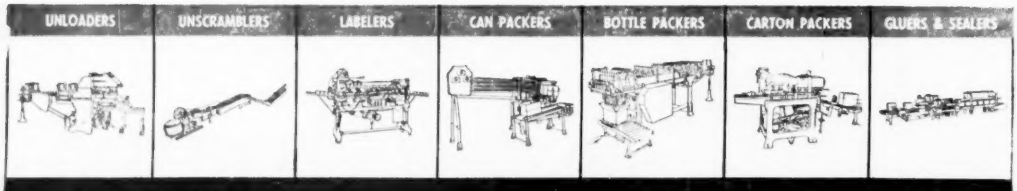
STANDARD-KNAPP EXPANDS ITS FAMOUS LINE TO INCLUDE ROCKWELL CARTONING MACHINES



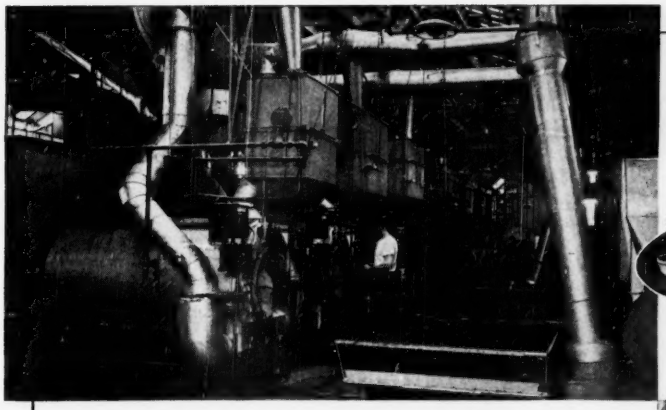
FULLY AUTOMATIC CARTONING MACHINE
— formerly known as Rockwell Cartoning Machine

STANDARD-KNAPP has acquired the entire line of machinery and equipment formerly produced by Rockwell Packaging Machines, Inc. Designed for versatility, these machines will now be backed up by the engineering, manufacturing, sales and service facilities of the Standard-Knapp organization.

We are prepared right now to discuss the installation of cartoning machines in any plant. Inquiries are invited concerning the application of these and other machines in the Standard-Knapp line to your packaging problems.



STANDARD-KNAPP Division of Hartford-Empire Company **PORTLAND, CONN.**



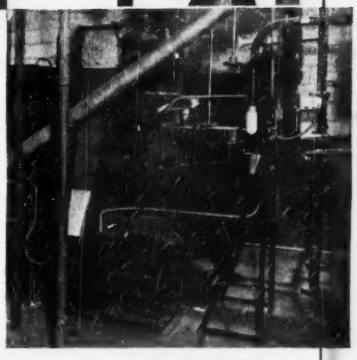
Battery of 9 batch Gas-fired coffee roasters. Gas burners fire vertically in combustion chamber, visible at extreme left.

Woolson official "cup tests" various coffee brands.

For Uniform Coffee Roasting

Woolson Spice Company

relies on GAS exclusively



Gas burner equipment and controls at charging end of new Jabez Burns continuous roaster.

FAST, UNIFORM ROASTING is essential to private brand coffees processing and packaging at Woolson Spice Company. This Toledo, Ohio, food manufacturer uses GAS in processing more than 10 tons of coffee per hour, and has been coffee-roasting with GAS exclusively for more than 25 years.

The original Jabez Burns coffee roasters employed a direct Gas-firing principle. These units were later modernized with Gas-fired air heaters with automatic controls, and the capacity of each roaster was increased 50%. The battery of 9 roasters has an output capacity of 25,000,000 pounds annually.

Increasing national per capita demand, now almost 19 pounds per year, recently required another expansion at Woolson Spice Company. Accordingly, a modern Gas-fired Jabez Burns continuous convection roaster was installed, bringing total annual production to 33,000,000 pounds.

For coffee roasting, or any other type of food processing, GAS has many advantages over other available fuels. The Woolson management expresses it this way: **"GAS is the only fuel which will roast our product economically, uniformly, and at the same time bring to each of our many blends the ultimate in consumer satisfaction."**

Your Gas Company Representative will help you take advantage of the modern methods of heat processing with GAS.

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVE., NEW YORK 17, N.Y.

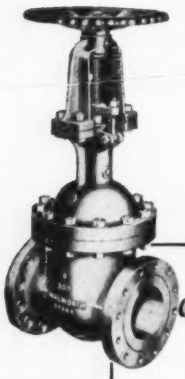
MORE AND MORE... THE TREND IS TO GAS FOR ALL HEAT PROCESSING OF FOODS

WALWORTH

Cast Steel Gate Valves

Series 150 and 300

Wedge Gate — Outside Screw and Yoke



Sectional view of Series 300

Big 8-Point Superiority!

Gland clearances are such that stem cannot be scored if gland should be tightened unevenly.

Deep Stuffing Boxes in all sizes (2″ to 24″) insure tightness and maximum packing life – costly leaks are eliminated.

Bonnets and Bodies are engineered to withstand pressure and minimize distortion – they're tough, durable, dependable.

Heavy Steel Walls provide extra strength and longer life.

Integral Body Guide Rib Faces are machined to insure accurate disc seating.

Seat Rings are bottom seated – not flange type. No recess exists at back of ring – hence no turbulence, erosion, or pressure drop.

Streamlined Ports allow high velocity, non-turbulent flow, and reduce the possibility of erosion.

Valves regularly have flanged ends. They can be supplied with ends for butt welding. Roller bearing yokes are available. On valves 5 inches and larger, by-passes can be furnished.

For Series 600 and higher, we recommend Walworth Pressure-Seal Steel Gate Valves.

For further information on Walworth Cast Steel Gate Valves, see your local Walworth distributor, or write:

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

"CUTTING SUGAR CANE" —AN ORIGINAL LITHOGRAPH BY HENRY E. WINZENREID

Filling America's Sweet Tooth

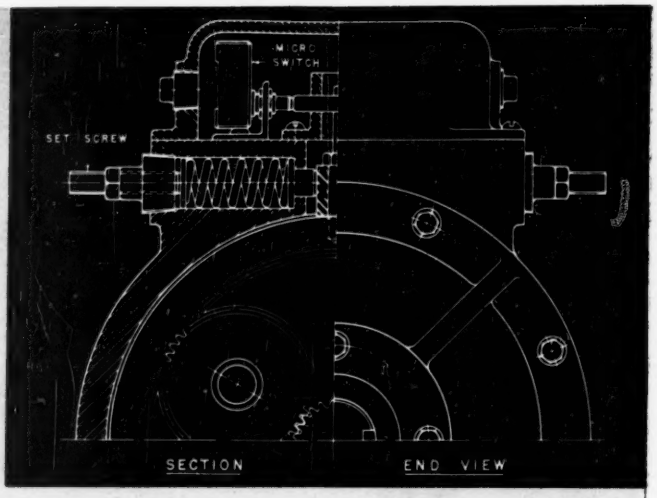
Sugar . . . and the countless things made with it . . . travel a long road from cane to consumer. Along the way, "sweets" need the help of protective papers to guarantee their wholesome goodness. These needs are often met with special Riegel Papers . . . tailor-made for the functional packaging of such products as candy, cake, chewing gum, ice cream, sugar and prepared desserts.

There's a Riegel Paper for almost any requirement you may have in protective packaging . . . a paper you can depend on for economy and production efficiency. We feel sure we can serve you in the same effective manner we now serve the sales leaders in so many different fields. Write us today.

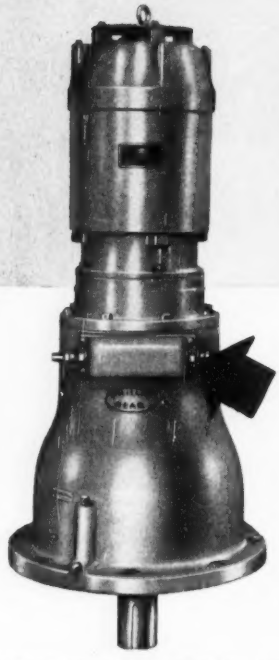
Riegel Paper Corporation • 342 Madison Avenue, New York 17, N. Y.

Riegel TAILOR-MADE PAPERS FOR PROTECTIVE PACKAGING

Positive Protection from OVERLOAD DAMAGE



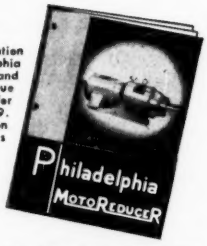
PHILADELPHIA PLANETORQUE MOTOREDUCER



CUTS OFF MOTOR CURRENT INSTANTLY AND AUTOMATICALLY

. . . when the load reaches a predetermined value, thus protecting both the driven machinery and the drive unit from overloads. This feature can be provided on any MotoReduceR . . . either vertical or horizontal types. On removal of the excessive load the PlaneTorque MotoReduceR may be started without resetting the switch. Incidentally, the PlaneTorque can be cut out during the starting period, by merely holding down the starting button; upon release PlaneTorque is again operative. The PlaneTorque is ideal for Stoker drives, Conveyors, Crushers, Mixers, Rolls, Pulverizers and a "hundred and one" other machines. MotoReduceRs are available in all required Horsepowers and Reduction Ratios. Efficiencies are as high as 97%.

For full information about Philadelphia MotoReduceRs and the PlaneTorque feature, send for Bulletin MR49. Please write on your Business Letterhead.



Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO • HOUSTON

IN CANADA WILLIAM AND J. G. GREEY LIMITED, TORONTO

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

WORTHINGTON

REFRIGERATION REPORT

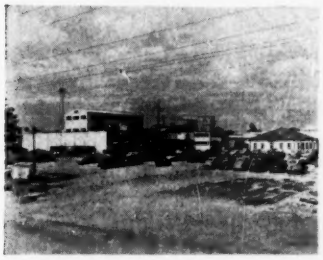
WORTHINGTON PUMP AND MACHINERY CORPORATION
HARRISON, NEW JERSEY

Specialists in air conditioning and refrigeration for more than 50 years

How We Help Squeeze 4 Oranges into 1

The frozen orange juice concentrate business is one of the most spectacular the post-war years have seen. Frozen orange juice now is said to account for more than 18% of all citrus sales.

Largest selling brand of concentrate is Minute Maid, and the Minute Maid Corporation plants at Plymouth and Davenport, Florida, provide interesting applications of Worthington refrigeration equipment.

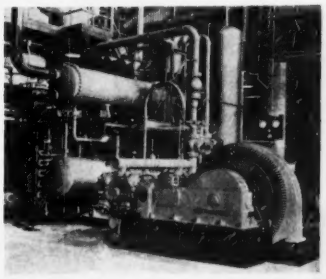


Minute Maid Corporation plant at Plymouth, Florida.

After the fresh fruit has been graded, peeled, blended, scrubbed, bathed in germicide, rinsed, regraded and juiced . . . the juice goes into what Minute Maid calls "concentrators." This equipment removes approximately 75% of the water from the juice at low temperature. This is done by reducing the pressure within the concentrator, which in turn reduces the boiling point of the orange juice.

The temperature of the orange juice in process never exceeds 75F and when the pressure approaches 10 MM, the temperature is about 60F. At this temperature, the equipment can remove 30,000 lb of water per hour.

Refrigeration equipment to condense the water vapor is furnished by Worthington 12" x 14" horizontal duplex single-stage ammonia compressors. There are three of these Worthington units, two in the Davenport plant, one at Plymouth. Each compressor operates in conjunction with



Worthington 12" x 14" ammonia compressor at Minute Maid's Plymouth plant.

a 38" x 18' condenser, 38" x 20' receiver, 46" x 16' vertical ammonia evaporator, 42" x 8' surge drum and float valve, 34" x 4' oil separator—all furnished by Worthington. Altogether this equipment produces 1464 tons of refrigeration.

Just as this advertisement was being prepared, an order was received from Minute Maid Corporation for similar Worthington equipment to be installed in a third plant at Leesburg, Florida.

Hormel Selects Centrifugal Refrigeration For Low Temperatures in Packing Plant

The new George A. Hormel packing plant at Fremont, Neb., uses Worthington centrifugal refrigeration for various low-temperature purposes.

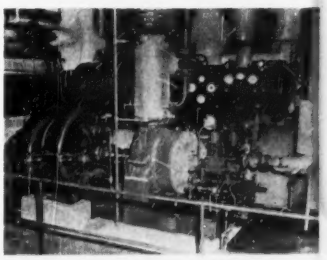
Three standard centrifugal systems —compressor, condenser and cooler —are used. The cooler, however, condenses ammonia gas for circulation as liquid to air units, freezers and ice-making units.

Advantages of this arrangement include: large capacity in small space; ammonia cycle completely oil-free; no flash gas, as cycle is at evaporating temperatures throughout; no liquid slop-back; heat balance achieved through turbine drive. Hormel has found by experience that maintenance cost is extremely low.

A 400-ton Worthington unit, using Freon-11, condenses ammonia at 17F for fresh, cured and smoked meat coolers.

A 225-ton Worthington unit, using Freon-11, condenses ammonia at 5F for the PakIce machine.

Packing room at George A. Hormel Co., equipped with Worthington centrifugal refrigeration.



231 hp turbine-driven centrifugal compressor used to produce 5 F ammonia at Hormel plant. Contractor: Buildice Co. Inc., Chicago.

A 250-ton Worthington unit, using Freon-12, cools ammonia from minus 55F to minus 60F for the blast freezer and calcium brine coolers.

In each case, the compressor is driven by a Worthington Steam Turbine.

AO-19

WORTHINGTON

AIR CONDITIONING AND REFRIGERATION

A complete line . . . in which *all* the vital components are made, not just assembled by Worthington. For more worth with Worthington, see your nearby Worthington distributor (consult Classified Telephone Directory).

The chemists could tell you a thing or two about Stainless Steel

YOU don't have to be connected with the process industries to know that many details of chemical processing are vital and closely-held secrets. But it's no secret that a very large share of this production, whether hush-hush or not, is conducted in equipment made of stainless steel—for the excellent reason that stainless steel is the *one* material that best meets the need for great strength and high resistance to corrosion, heat and wear.

Put it this way: Allegheny Metal equipment gets the call because stainless steel lasts longer, looks better, cleans easier and quicker, maintains top purity standards and holds maintenance and depreciation costs down to the bottom.

That's why Allegheny Metal is a highly essential material, especially in time of national need. We've spent (and are spending) many millions of dollars to increase our production, but it is still necessary to make every ton of stainless steel go as far as possible.

• Let our engineers help you *to use* Allegheny Metal and other alloy steels to the best advantage.

* * * * *

Complete technical and fabricating data—engineering help, too—are yours for the asking from Allegheny Ludlum Steel Corporation, Pittsburgh, Pa. . . . the nation's leading producer of stainless steel in all forms. Branch Offices are located in principal cities, coast to coast, and Warehouse Stocks of Allegheny Stainless Steel are carried by all Joseph T. Ryerson & Son, Inc. plants.

WAD 3269

You can make it **BETTER** with

Allegheny Metal

AL TIME-TESTED STAINLESS STEEL

SYLVANIA CELLOPHANE

keeps bakery packaging in TUNE!

The printed bag used for this English muffin package is Sylvania Cellophane MS-3 in the 300 gauge.

Special properties tailored to your specific requirements tell why:

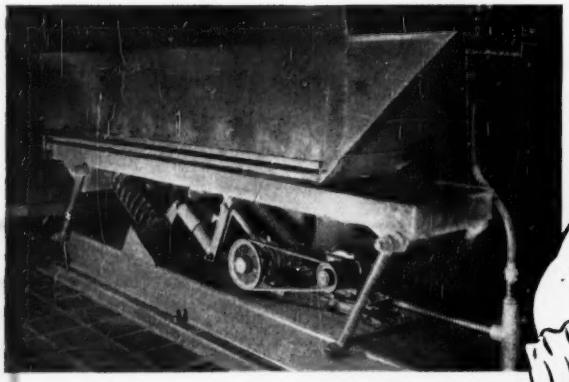
1 Low cost
2 Moisture protection
3 Transparency
4 Sales appeal
5 Excellent printing surface

SYLVANIA® CELLOPHANE

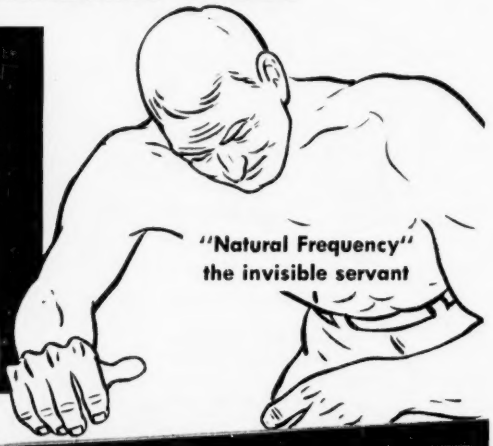
Mr. Cellophane is always available to help you solve your packaging problems. Talk over your requirements with your Sylvania representative or write us mentioning the specific application in which you are interested. Address: Market Development, Dept. F-12.

SYLVANIA DIVISION AMERICAN VISCOSE CORPORATION
Manufacturers of cellophane and other cellulose products since 1929
General Sales Office: 1617 Pennsylvania Blvd., Philadelphia 3, Pa.
Plant: Fredericksburg, Va.

HOW "Natural Frequency" CONVEYOR CUTS POWER COSTS SHARPLY IN HANDLING FOODS



S-A Natural Frequency Conveyor handles bran as discharged from dryer in large cereal plant.



"NATURAL FREQUENCY" AS A SOURCE OF POWER

It's a new application of an old principle—use of springs to vibrate a trough and convey materials. Coil springs are used—proportioned to vibrate naturally at the best frequency for conveying. Absorbed power is regenerated, or returned, by the springs to start the next stroke. Once Conveyor is in motion, power input is reduced to a minimum.

Synchronized eccentric drive with only three bearings actuates coil springs and rocker arms to a point of natural frequency vibration for most efficient and economical operation. Conveyor requires minimum headroom . . . has few working parts.

also blends—cools—dewaters—dries—scalps

This new S-A conveyor utilizes powerful natural frequency of vibration and the regenerative power of coil springs. Net results are improved conveying—with low power requirement. Conveys practically any bulk material. Gentle agitation aids in blending, cooling, dewatering, drying, scalping off oversize, etc. In many ways the S-A vibrating conveyor can bring efficiency and economy to thousands of bulk materials handling applications in food plants. Consider how it can serve your needs. *Ask for Bulletin 950 descriptive of Natural Frequency Conveyors.*

STEPHEN S-A ADAMSON MFG. CO

6 Ridgeway Avenue, Aurora, Illinois · Los Angeles, Calif. · Belleville, Ontario

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT

New Boston Hospital 100% EQUIPPED with JAMISON Doors

Beth Israel Hospital, one of the newest and finest institutions in Boston, selected Jamison for all their cold storage door needs . . . 42 Walk-In doors and 95 Reach-In doors. Whether you need a single standard door or a complete installation of special design, Jamison can take care of your cold storage door needs. Write for Catalog 175.

Track Vestibule Door to speed movement of meat from storage into kitchen. Note special stainless steel cladding on back of door.

One of 13 diet service kitchen refrigerator fronts with two cooler sections, a freezer section and an ice bin.

JAMISON

HAGERSTOWN, MARYLAND, U. S. A.

The leader for over 50 years

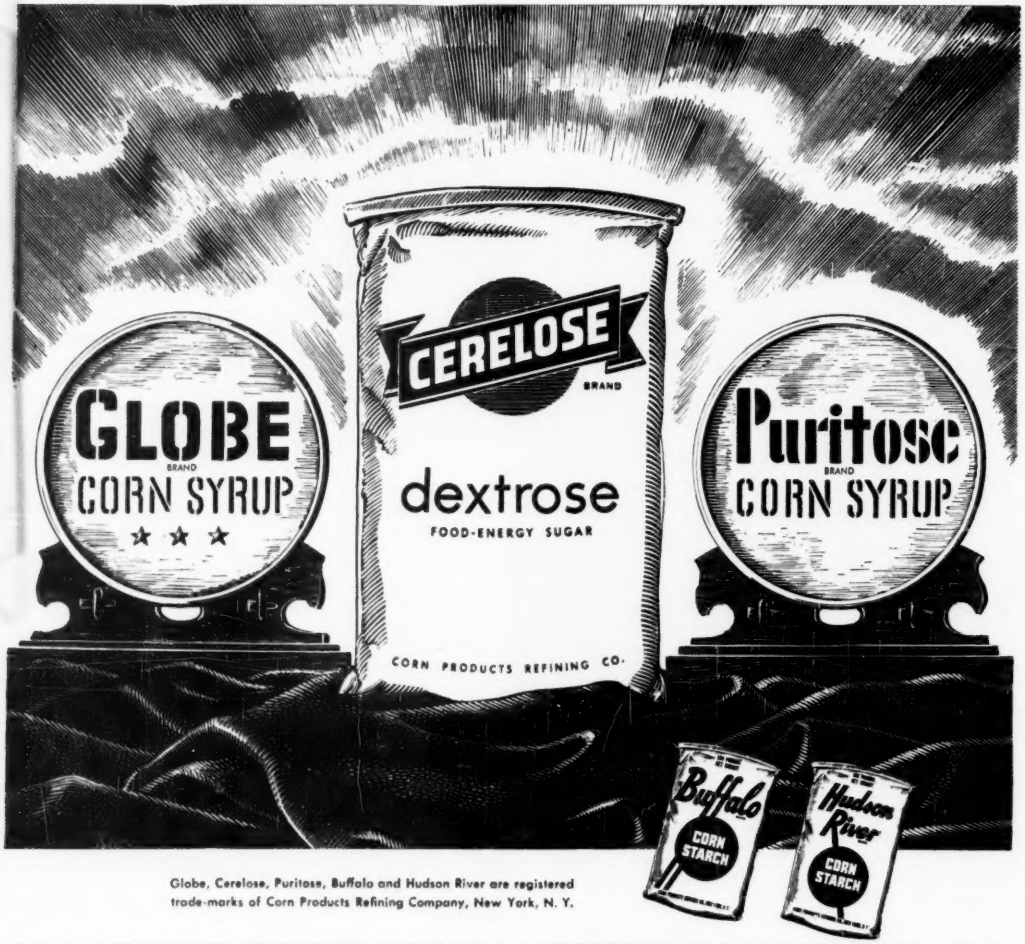
JAMISON COLD STORAGE DOOR CO. • HAGERSTOWN, MD., U. S. A.

Make the most of these fine products...

make the most of these facilities

Continuing basic research, with the foremost research men in the industry directing a comprehensive program in corn products chemistry.

Technical and engineering services, to help you apply new methods, new products and new procedures in your production. On-the-spot studies can be made by highly skilled technical men ...no obligation to you. Just write Technical Service Department.



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CORN PRODUCTS REFINING COMPANY, 17 BATTERY PLACE, NEW YORK 4, N. Y.

NO MECHANICAL AIR CLEANER CAN MATCH

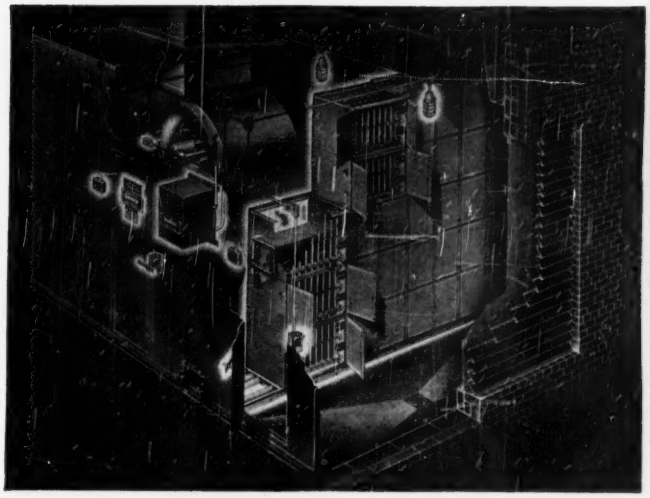
Precipitron®

THE *ELECTRONIC* AIR CLEANER

When you buy an air filter, you are buying its *cleaning ability*. So consider this—while the best mechanical filters remove up to 30% of airborne dirt by volume, Westinghouse PRECIPITRON electronically removes 90% of *all* particles—even microscopic particles.

If airborne dirt is an obstacle in your manufacturing process, causes soilage, creates a hygienic problem or increases housekeeping costs, you need PRECIPITRON! This electronic cleaner will remove particles you can't see—as tiny as 1/250,000 of an inch.

PRECIPITRON, with its all-aluminum individual cell construction, offers you money-saving advantages. Greater plate area per cell enables you to clean any given volume of air at lower cost with less space and equipment. High resistance to rust and corrosion cuts maintenance, and its light weight means easy installation.



In terms of an air cleaner for your application, PRECIPITRON is unmatched. For complete information, write to Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Massachusetts.

YOU CAN BE SURE...IF IT'S

Westinghouse

J-80186

They've got 5 at Mars, Inc.

Yes, Mars, Incorporated, Chicago, Illinois, has 5.

Five what? Five Carrier Centrifugal Refrigerating Machines.

What do they do?

They provide product conditioning for packing rooms and production departments. They chill brine to low temperatures for refrigeration. They provide comfort conditioning for office spaces. And they eliminate variable temperatures and humidities, help standardize the product, help automatic machinery operate at peak efficiency.

What makes them a good investment?

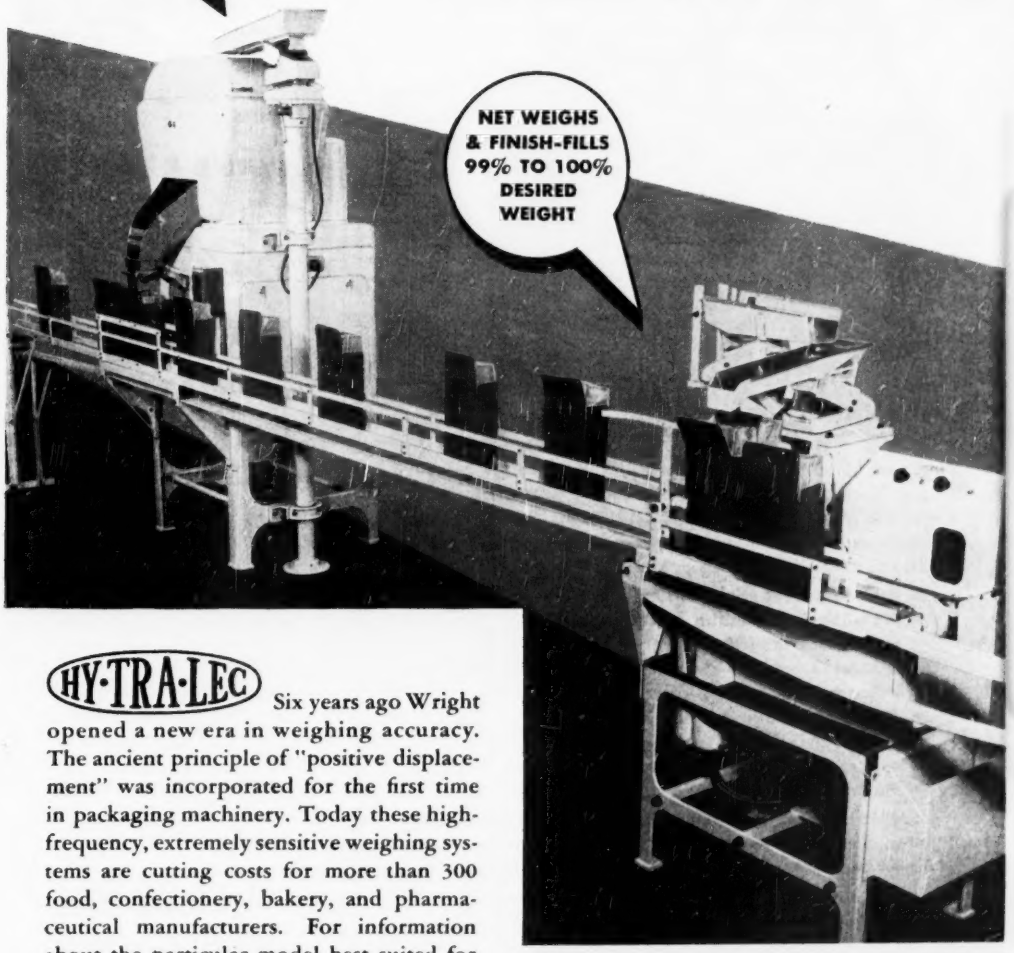
Carrier Centrifugal Refrigerating Machines are compact – they pack a lot of refrigeration in a little space. They are dependable – the compressor has just one major moving part – a precision-balance rotor. They operate with practically no vibration. They require only a small concrete base. They may be fitted into the plant heat balance – will use exhaust steam or act as a reducing valve for high steam pressure. Carrier Corporation, Syracuse, New York.

Carrier AIR CONDITIONING · REFRIGERATION · INDUSTRIAL HEATING

New One-Two Punch KO's Weighing Problem

NET WEIGHS & PRE-FILLS WITHIN 98% OF DESIRED WEIGHT

Wright's Hy-Tra-Lec Accuracy Hits New Record With Latest Model For Handling Crackers. New Challenges Are Welcomed.



HY-TRA-LEC Six years ago Wright opened a new era in weighing accuracy. The ancient principle of "positive displacement" was incorporated for the first time in packaging machinery. Today these high-frequency, extremely sensitive weighing systems are cutting costs for more than 300 food, confectionery, bakery, and pharmaceutical manufacturers. For information about the particular model best suited for your product, write or call today.

WRIGHT MACHINERY COMPANY

EST. 1893 • 333 CALVIN ST., DURHAM, N. C.
SUBSIDIARY OF THE SPERRY CORPORATION

COMPANY SALES OFFICES: JERSEY CITY · CHICAGO · DURHAM WEST COAST REP.: KING & ANDERSON, SAN FRANCISCO SOUTHWEST REP.: R. P. ANDERSON COMPANY, DALLAS CENTRAL REP.: HAL HUDSON EQUIPMENT COMPANY, TOLEDO EUROPE: SPERRY GYROSCOPE COMPANY, LTD., LONDON

OMEGA

Small size, big capacity — you get both features in this new dry material feeder. Ruggedly built, the Omega Midget Belt Gravimetric is small enough to fit on your desk top — yet its capacity is big enough for heavy feeding loads. Never before have so many feeder-features been packed into so small a space:

- **Stainless-steel construction**
- **Non-flooding feeding mechanism**
- **Dust-proof feeding**
- **Unusual capacity — from cubic inches to 3 cubic feet per minute**
- **One-piece conveyor belt**
- **Simple mechanical feeding control**
- **Operates with ¼ HP motor**
- **Compact — needs only 6 sq. ft. space**

For detailed information, including dimension drawings and engineering data, send for new Bulletin 35-G5. Omega Machine Co. (Division of Builders Iron Foundry), 402 Harris Ave., Providence 1, R. I.

OMEGA manufactures a complete line of volumetric and gravimetric feeders for dry materials and for gravity feeding of liquids and solutions:

Belt-Type Gravimetric Feeders • Loss-in-Weight Gravimetric Feeders • Universal Feeders • Precision Solution Feeders • Disc Feeders • Rotodip Solution Feeders Rotolock Feeders • Dust Collectors • Bucket Elevators

THE LAST WORD IN FEEDERS

OMEGA

HERE'S A

Parade

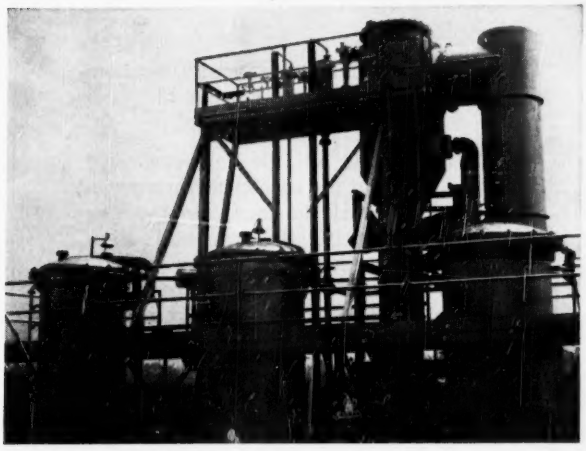
YOU WON'T WANT TO MISS...

Everybody loves a parade but here's one that's particularly interesting to YOU because it's packed with "pocket-book" appeal. It's a never-ending parade of products and services designed to help you do *your* job better, quicker and cheaper. You're in the "reviewing stand" for this parade because it comes to you in the advertising pages of every issue of this magazine. Alert manufacturers use these advertising pages to get the *news* about their products and services to *you*... quickly and effectively. To be well-informed about the latest developments in *your* industry... and to stay well-informed... *read all the ads too.*

McGRAW-HILL PUBLICATIONS

3-Phase Juice Concentrator *Safeguards Flavor*

Contains 390 *Carpenter* Stainless Tubes



390 tubes in each 3-phase concentrator are used to exchange heat from vapors to citrus liquids on insides of tubes. Job requirements: Sanitary operation, corrosion and heat resistance, easy rolling-in for tube sheets.

To safeguard product quality—and to reduce clean-up time—each of these 3-phase concentrators contains 3" O.D. x 16 gauge Carpenter Stainless Tubes throughout. In addition to the sanitary and heat transfer requirements, this fabricator needs unvarying tube wall uniformity that permits easy and accurate rolling-in.

When you need the sanitary features of Stainless Tubing and Pipe—when you want them at reasonable cost—it's time to talk to Carpenter. Make use of our many years of experience in solving food process and fabrication problems.

Useful Stainless Tubing Data Yours for the Asking...

This 12-page booklet of information on Carpenter Stainless Tubing contains information you can use to advantage: Standard Sizes, Physical Constants, Heat Resistance, Special Shapes, Corrosion Resistance, etc.

A note on your company letterhead will start the 12-page Carpenter Stainless Tubing booklet on its way to you.

THE CARPENTER STEEL COMPANY
Alloy Tube Division, Union, N. J.
Export Department: Woolworth Bldg., New York 7, N.Y., "CARSTEELCO"

Carpenter
STAINLESS TUBING

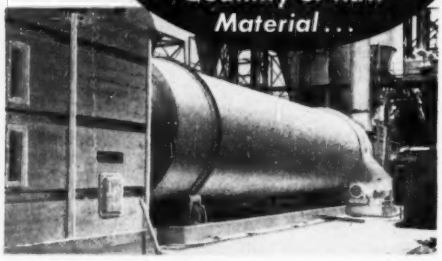
—guaranteed on every shipment

When you have a new or unusual process or piping problem, call your nearest Carpenter Stainless Tubing Distributor or Cherry-Burrell Branch.

Profitable LOW TEMPERATURE DRYING...

Particle size never heated above 212°F. No scorching. No burnt odors.

$42,000.00 MORE REVENUE PER SEASON *From Same Quantity of Raw Material...*



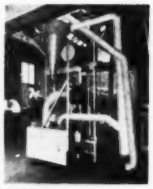
ANOTHER EXAMPLE OF STANDARD-HERSEY DRYER ECONOMY

Here is an excellent demonstration of how STANDARD-HERSEY advanced engineering makes drying operations more profitable. Used for continuous drying of fish meal, this Standard low temperature plant actually increases the yield up to 10% and the protein value 1½ to 2 units per ton of meal, as compared with conventional high temperature methods. Other product applications include meat scraps, sewage, starch, pectin, etc.

COMPARISON WITH DIRECT HEAT DRYING

(From Geo. W. Gooch Laboratories Ltd. Report)	Direct Heat Dryer	Standard Low Temperature Dryer
Meal produced per season from given quantity of raw material..	3,050 tons	3,350 tons
Protein at 60% at $2.00 per unit..	$116 per ton	$120 per ton
Gross revenue.....	$353,800.00	$395,900.00

Gain of 300 tons of meals.....$36,000.00
Gain of 2% in protein.....6,100.00
Grand total gain.....$42,100.00



STANDARD-HERSEY TEST DRYER

Let our "pilot" test dryer help determine how your product can best be dried. Duplicates performance under factory conditions of *any* type rotary dryer with *any* material.

MORE THAN 30 DIFFERENT TYPES OF STANDARD-HERSEY DRYERS ARE AVAILABLE FOR EVERY PROCESS INDUSTRY NEED—

Write for New Dryer Bulletin

STANDARD HERSEY *Dryers*

STANDARD STEEL CORPORATION
5045 Boyle Avenue, Los Angeles 58, California
Eastern Address: 123—45 Newbury Street, Boston 16

ah! what delicious flavor

You'll agree, your customers will agree, it's the FLAVOR that makes the meal.

D&O has the Perfect Flavor and the correct flavoring materials to serve your every specific flavor requirement starting from shrimp cocktail sauce, to soup, to gravy... including powdered dessert and cake frosting.

SPICEOLATES,

the water-soluble spice flavors made by D&O from pure natural oils and oleo resins offer greater economy and completely uniform flavor quality. Spiceolates are pure products in every respect.

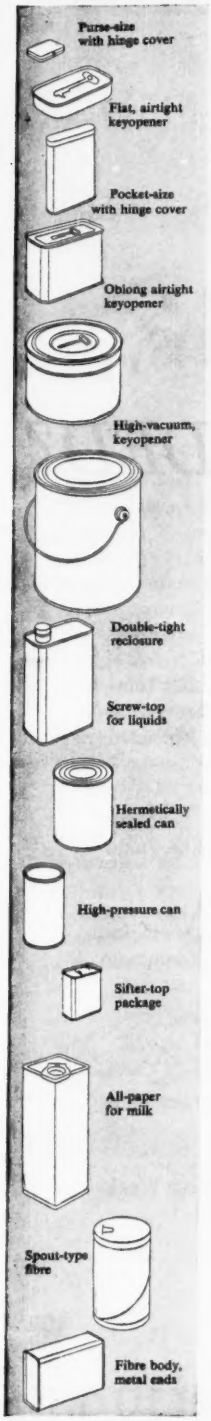
Additional information concerning the use of Spiceolates on request.

For better flavors . . . consult D&O.

D&O DODGE & OLCOTT, INC.
180 Varick Street • New York 14, N. Y.

ATLANTA • BOSTON • CHICAGO • CINCINNATI • DALLAS
LOS ANGELES • PHILADELPHIA • ST. LOUIS • SAN FRANCISCO
ESSENTIAL OILS • AROMATIC CHEMICALS
PERFUME BASES • VANILLA • FLAVOR BASES

WHICH PACKAGE SUITS YOUR PRODUCT?



"OB-ROUND" shape means more cans pack in shipping container; more squirt per squeeze—from bellows-action sides that won't stick. Three heights (same size base): 1 oz; 3 oz; 4 oz. Full space for litho-label in many colors. Two types of closing machines available—for high-speed and for semi-automatic, limited production.

NECKS are integral part of top and are lined with synthetic rubber compound which is oil and solvent-resistant for effective sealing.
SPOUTS available in moulded plastic, transparent or colored, or extruded soft metal.

If the consumer uses your product in small amounts at a time...

this packaging suggestion may interest you

TWO USEFUL PRINCIPLES are apparent in Canco's familiar lighter-fluid and household oil container.

The little nozzle dispenses a small amount at a time, and the screw top makes a tight reclosure for a volatile liquid.

In addition to lighter fluid

Immediately, it looks as if this container would be adaptable in some form to cologne, liquid deodorants, sun-tan lotions, cleaning fluids, polishes, rubbing alcohols, and oil and other liquid hair preparations.

How about this container for viosterol and other highly concentrated liquids requiring measurement by drops?

It's a thought to consider, and perhaps your package-development people and ourselves should talk things over.

Since 1901, Canco has been out front in creating new and more effective packages. There is hardly a major development in the packaging industry—whether it be for a food or non-food product, whether the problem is metal, or fibre, or a combination of both—that this keen, alert organization has not pioneered.

Canco can help you with eye-catching label designs, cost-cutting, sales-building advice on packages, processes, filling and closing.

Canco stands ready to serve you promptly in production-line emergencies. From Canco you get as many containers as you need when you need them. Let's get together! *Call Canco first . . .*

AMERICAN CAN CO.

CANCO

NEW YORK
CHICAGO
SAN FRANCISCO
HAMILTON, CANADA

are businessmen

COLD-BLOODED?

OF COURSE NOT! Literally, their normal body temperature is 98.6—same as laborers, engineers or any other group of people. And, figuratively, they're no more, or no less, cold-blooded—as a group.

We all know unreasonable generalizations can be dangerously false. Common sense and on-the-job experience show us the value of dealing specifically with ideas, problems—and *people.*

Let's not make the big—and costly—mistake, then, of generalizing on religious or racial groups. Adopt and *carry out* these common sense principles:

1. Accept—or reject—people on *their individual worth.*
2. Don't listen to or spread rumors against a race or a religion.
3. Speak up, wherever we are, *against* prejudice. Work for understanding.

A PUBLIC SERVICE PROJECT ★ THE ADVERTISING COUNCIL ★

Published in the public interest by:

McGraw-Hill Publications

Ask any Dietitian—she'll tell you

"Enriched Foods and Fortified Foods are *Preferred* Foods"

AMERICAN dietitians and nutritionists long ago added their endorsement to the Bread and Flour Enrichment Program. And again they have been proved right by the results of the large-scale Newfoundland Nutrition Surveys.

These authoritative surveys reaffirmed that enriched and fortified foods promote better bodies, *healthier* bodies, sharply reduced infant mortality, lower tuberculosis and over-all death rates—improvement in both the quantity and quality of life.

When you enrich and fortify with Merck Vitamin Products you *know* that the faith of millions of Americans is fully protected. Merck Vitamin Products come from the same organization that pioneered in the research and large-scale development of thiamine, riboflavin, niacin, vitamin C, and other important nutrients. And now, the most recent contribution is thiamine mononitrate, a form of thiamine that has the advantage of greater stability in certain food applications.

With the enrichment program, as well as general food fortification, steadily growing in stature, Merck continues to lead in every distinct, forward step.

Merck Vitamin Products for Enrichment and Fortification

VITAMIN B_1
Thiamine Hydrochloride · Thiamine Mononitrate

RIBOFLAVIN (Vitamin B_2) **NIACIN** (Nicotinic Acid)

ASCORBIC ACID (Vitamin C)

Merck Enrichment Ingredients for Millers, Bakers, Cereal and Macaroni Manufacturers • Merck Vitamin Mixtures for Flour Enrichment • Merck Bread-Enrichment Wafers • Merck Vitamin Mixtures for Corn-Products Enrichment • Merck Vitamin Mixtures and Wafers for Macaroni Enrichment.

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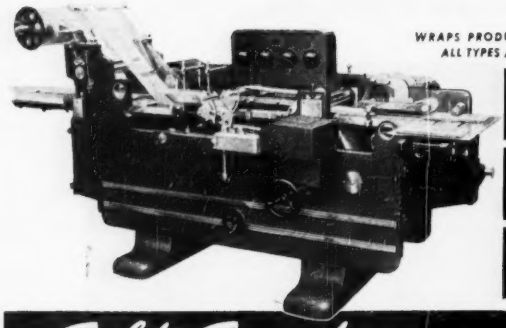
MERCK & CO. Limited Montreal · Toronto · Valleyfield

Merck Knows Vitamins

MERCK

Merck Vitamin Products for Enrichment and Fortification



WRAPS PRODUCTS OF ALL TYPES AND SHAPES.

Split Second FOOD PACKAGING

Continuous feed wrapping seals flavor-freshness in...*Keeps Moisture in or out!*

Cakes, Cookies, Crackers and many other food products reach a new high in packaging production with the revolutionary Campbell Wrapper. It more than doubles the speed of many wrappers and saves time, labor and money with fewer operators — less materials. "Float" wrapping with longitudinal heat or glue sealing and ends flared, crimped or folded guarantees product protection equal to the wrapper itself. Uses all types of packaging materials and accurately registers printed names and designs. Available in Straight, L, or any Custom type feed required. Write for complete information and brochure.

up to 120 units PER MINUTE!

Campbell WRAPPER

HUDSON-SHARP MACHINE CO. • GREEN BAY, WIS.
Manufacturers

THOROUGH MIXING FASTER COOKING AT LOWER COSTS

Actual production figures show that processing costs go down, efficiency goes up with Hamilton Stainless Steel Steam-Jacketed Mix-Cookers. Built to ASME Specifications, Hamilton Stainless Steel mix-cookers are available with single or double action agitators. Stock specifications include maplewood scrapers, but can be furnished with soft metal or plastic scrapers guaranteed not to effect taste or flavor of product.

Extra large steam jacket and fittings, plus larger draw-off, will speed operation, cut costs. (Draw-off sizes up to 4" and larger if necessary.) Investigate the Hamilton Stainless Steel Mix Cooker and Tilting Kettles today.

HAMILTON

copper & brass works

1105 Lincoln Ave., Hamilton 8, Ohio

Since 1876

HAMILTON COPPER & BRASS WORKS, INC. HAMILTON, OHIO

Please send complete information on Hamilton Stainless Steel Mix Cookers. A

NAME .....

ADDRESS .....

COMPANY .....

...You Get Exclusive Extra-Wear Features in

New Heavy-Duty PIONEER STANZOIL® BLACK NEOPRENE Coated Canvas Gloves

Exclusive PIONEER Non-Slip Grip Holds wet things as if dry.

Curved Fingers Extra comfort and efficiency.

Preflex Palm Design Prevents wear from bunching.

Inserted Thumb Design No inside seam to wear through quickly.

Heavy Black Neoprene Coating Liquid resistant, durable.

Glove is full weight 8 oz. canton flannel Comfort, long wear.

Those six features mean far more glove service for your money. Heavy-Duty STANZOILS not only wear and wear on heavy-duty jobs, but give real hand protection, extra resistance to oils and acids. And they enable workers to do more work with less effort. Write today for information and prices on this line of Heavy-Duty STANZOIL DuPont neoprene coated canvas gloves. *The Pioneer Rubber Company, 673 Tiffin Road, Willard, Ohio.*

STANZOIL PIONEER

OVER *30 Years* OF QUALITY GLOVE MAKING

C.H. Wheeler ENGINEERS help you reduce refrigeration costs

5 to 20% in food processing

Steam Jet Vacuum Refrigeration Unit with Barometric Condensers

They can help you save 5 to 20% over the cost of mechanical refrigeration, if you have live or exhaust steam available, and require moderate chilled water temperatures from 35° to 65°F. Purchase price is lower, because units are standardized in a wide range of sizes. Installation costs less. And — most important of all — long range maintenance cost is lower. There are no moving parts in the system except the chilled water pump.

Employing only water, cooled by flash evaporation, you eliminate hazards of noxious and poisonous refrigerants. In direct cooling of liquid food products, you get the added advantage of deaeration during the cycle of flash evaporation.

Most C. H. Wheeler installations are of a confidential nature. Our engineers will be glad to work with you in applying the correct vacuum equipment for your process.

Catalog 1462, yours for the asking, has many suggestions and charts of value to you who have a vacuum or refrigeration problem.

C.H. Wheeler OF PHILADELPHIA

VACUUM REFRIGERATION—COOLING TOWERS—HIGH VACUUM PROCESS EQUIPMENT—MICRO-PARTICLE REDUCTION MILLS—STEAM CONDENSERS—STEAM JET EJECTORS—MARINE CONDENSERS & EJECTORS—DECK MACHINERY

C. H. WHEELER MANUFACTURING CO., 1828 SEDGLEY AVE., PHILADELPHIA 32, PA.

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Reports—Layouts—Canning and Freezing Processes—Food Bacteriology—Sanitary Control—Food Engineering — Atmospheric Pollution — Unit Operations—Process, Product and Equipment Design—Industrial Heating, Ventilating, Air Conditioning and Refrigeration.
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Organoleptic Panel Testing, Formulations and Stability, Protective Packaging
We have a wealth of applied research for profits, production, available to the food industries.
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Consulting Service
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Industrial Consultants
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Consulting Engineers to the Food Industries
Mechanical Management and Process Engineering. Investigation and Reports. Plant Layout and Design. Methods and Procedures.
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FOOD RESEARCH LABORATORIES, INC.
Philip B. Hawk, Ph.D., President
Bernard L. Oser, Ph.D., Director
Research, Analyses, Consultation for the Food, Drug and Allied Industries.
48-14 33rd Street, Long Island City, N. Y.

MODERN VINEGAR SERVICE
Large recirculating vinegar making units to fit any requirements. Design, Installation, Operation, Alterations, Consultation.
P. O. Box 103, Station M
Los Angeles 32, Calif.

SCHWARZ LABORATORIES, INC.
Chemical and biological analyses of food materials and products. Food plant design, inspection, process examination and control. More than 75 years of experience serving the food and beverage industries.
Write for bulletin
"Science Quality Control of Foods and Beverages"
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HANSON-GORRILL-BRIAN, INC.
Planning - Development - Design
Process, Control & Inspection Equipment
One Continental Hill — Glen Cove, N. Y.
Glen Cove 4-1922

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Successors to
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Food Technologists and Engineers
Specialists in Food Preparation and Preservation; Equipment Testing and Evaluation; Food Freezing; By-Product Utilization; Manufacture of Pure Fruit Flavors.
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Consulting—Designing—Supervising Architects • Chemists • Engineers
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WISCONSIN ALUMNI RESEARCH FOUNDATION
Laboratory Services
Vitamin assays - Proximate analyses
Bacteriological testing of sugars, syrups, starch, water, meats, egg products, and canned foods
Fat and oil constants
Spectrophotometric analyses
P. O. Box 2059 — Madison 1, Wisconsin

INGREDIENTS for the FOOD PROCESSOR

Contains wide range of
NUTRITIONAL RESEARCH PRODUCTS
BIOLOGICAL TEST DIETS
TEST DIET INGREDIENTS
VITAMINS (CRYSTALLINE)
AMINO ACIDS (CRYSTALLINE)
MICROBIOLOGICAL MEDIA
VITAMIN SUPPLEMENTS
RESEARCH BIOCHEMICALS
CAROTENE CONCENTRATES
General Biochemicals, Inc.
56 Laboratory Park, CHAGRIN FALLS, OHIO

CARROT OIL makes foods golden yellow

Carrot oil, like butter, contains carotene. Carrot oil is extracted from carrots, and each pound contains up to 25 million units of carotene, the international standard of vitamin A.
Carrot oil is preferred for vitaminizing foods because it is a natural vegetable oil, and because it contributes vitamin A of high stability and desirable golden yellow color. Carrot oil is not synthetic, does not contain animal fats of any kind, and does not produce fishy flavor.

SEND FOR BOOKLET
New 36-page combined catalog on carrot oil for foods, feeds, and pharmaceuticals. Important reading for most food processors. Write today!
NUTRITIONAL RESEARCH ASSOCIATES
205 Broad St., South Whitley, Ind.

If this or other advertising does not supply the information wanted concerning ingredients for the food processor, please write:
FOOD INDUSTRIES

WHERE TO BUY

CORROSION-PROOF TANKS & FLOORING
- Corrosion-proof construction of processing and storage tanks; industrial flooring.
- Experience serving major steel, chemical, textile, food plants.
- Complete Facilities: Design . . . Engineering . . . Materials . . . Construction . . . Maintenance.

Write for bulletin giving full data
601 Chemsteel Building, Walnut Street, Pittsburgh 32, Pa.
CHEMSTEEL CONSTRUCTION COMPANY, INC.
Specialists in Acid-Proof Construction

- Contact Meters
- Pyrometers

SIM-PLY-TROL ASSEMBLY PRODUCTS, INC.
Chagrin Falls (4), Ohio

WHAT MAKES A MAILING CLICK?

Advertising men agree — the list is more than half the story.

McGraw-Hill Mailing Lists, used by leading manufacturers and industrial service organizations, direct your advertising and sales promotional efforts to key purchasing power. They offer thorough horizontal and vertical coverage of major markets, including new personnel and plants. Selections may be made to fit your own special requirements.

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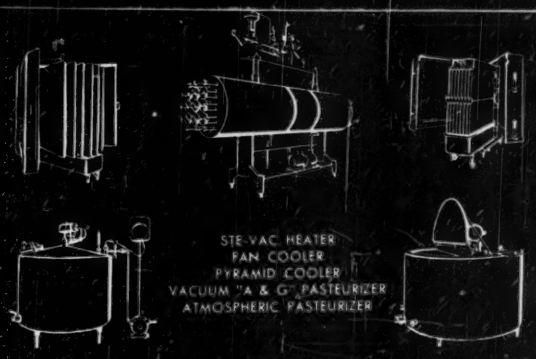
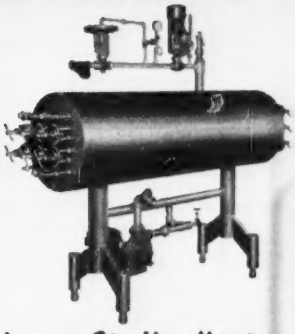


HEATS ICE CREAM MIX TO 190° WITHOUT "BURN ON"



The Chester-Jensen Ste-Vac Heater

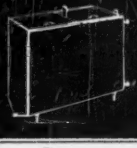
Heat chocolate and white mix with equal ease and results. Heat complete mixes without difficulty even though ingredients are not wholly dissolved before entering the heater. And with a lower bacteria count than ever before attained.

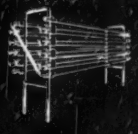
You will do all that with a Ste-Vac Heater and, regardless of the number of hours of operation, the tubes will be found to be so clean that washing and sterilizing is a simple matter.

Capacities of Ste-Vac Heaters range from 400 to 4,000 gallons per hour. Full details and descriptive bulletins gladly sent on request.

61

BEVERAGE COOLERS


INDUSTRIAL CHILLED WATER UNITS


INTERNAL TUBE HEATER-COOLERS

Chester-Jensen Company
5th AND TILGHMAN STS. CHESTER, PENNSYLVANIA

DEALER COOLERS

SUPER DEODORIZER

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:
Not available for equipment advertising
$1.20 a Line—Minimum 4 Lines.
To figure advance payment count 5 average words as a line.
INDIVIDUAL EMPLOYMENT WANTED undisplayed advertising rate is one-half of above rate, payable in advance.
PROPOSALS, $1.20 a line an insertion.

INFORMATION:
BOX NUMBERS count as one additional line.

DISCOUNT OF 10% if full payment is made in advance of four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE:
The advertising rate is $11.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page. F.I.

NEW ADVERTISEMENTS received by 10 A. M. December 20th at the New York Office, 330 W. 42 St., N. Y. 18, N. Y. will appear in the January issue subject to limitations of space available

MEAT CANNING SPECIALTIES MAN

Who has heavy experience in canning specialty meat products. Must know procedure and formula, and be able to take full charge of this department. Write in detail to

P-8335, Food Industries
330 W. 42 St., New York 18, N. Y.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

FOOD CHEMIST with background in bakers specialty products. Experience in jams, jellies, powders, flavors & quality control essential. Plant located in Michigan. State experience, education, and give references. P-8145, Food Industries.

FUTURE FOR Chemist with research and production background in bakers' specialty product. Man we want must have product development and quality control experience, and have knowledge of baking industry. He must be able to assume complete charge of production of one of the well-established companies in the industry—we are not a supply house. Base pay plus percentage of profits make this an unusual opportunity. Please give references, experience and education. Replies will be held in confidence and no references contacted prior to personal interview. P-8221, Food Industries.

FOREMAN FOR food canning plant. S. E. Mighton Co., Bedford, Ohio.

EMPLOYMENT SERVICE

SALARIED PERSONNEL $3,000-$25,000. This confidential service, established 1927, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. F, 241 Orange St., New Haven, Conn.

POSITIONS WANTED

CHEMICAL ENGINEER with 2 years experience in Quality Control Dept. of Food processor desires permanent position in Food Field. PW-8336, Food Industries.

CHEMIST-BACTERIOLOGIST. Original ideas. Rich background. Experienced Food Factory Control, new products research. Seeks research opportunity food industry. PW-8240, Food Industries.

SELLING OPPORTUNITIES WANTED

SALES REPRESENTATIVE—15 years experience in food-beverage field, with strong contacts in California—desires additional lines on commission basis. RA-8347, Food Industries.

WANTED EXCLUSIVE west coast distribution for reliable manufacturer of raw materials for Cosmetic, Food, Pharmaceutical and other allied industries by long established West Coast Sales organization with own warehouse facilities, main office in Los Angeles. Replies treated confidential. RA-8217, Food Industries.

WANTED

ANYTHING within reason that is wanted in the field served by Food Industries can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

Mechanical Engineer

Must have broad experience to supervise division responsible for the development of bakery production machinery of all types. Excellent opportunity for man possessing administrative ability and sound judgment. Limited traveling with headquarters in General Office New York City. Normal work week less than 35 hours. Salary $800.00 to start. State age, education and experience. Write to

P-8218, Food Industries
330 W. 42 St., New York 18, N. Y.

FOOD CHEMISTS

JR. AND SENIOR

NUTRITIONIST, Ph.D., ...$6,000
Under 40, "small animal exp."

RESEARCH CH., deg., ...OPEN
Essential oils, flavorings.

Call, write or wire:—Gladys Hunting (Consultant)

DRAKE PERSONNEL
7 W. Madison St. Chicago 2, Ill.

COURSES IN FOOD TECHNOLOGY

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b. Food Analysis
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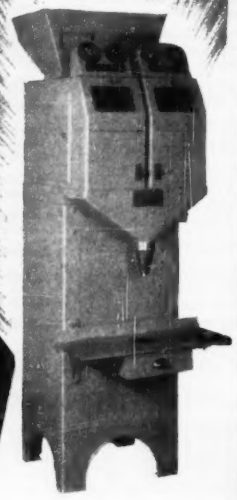

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